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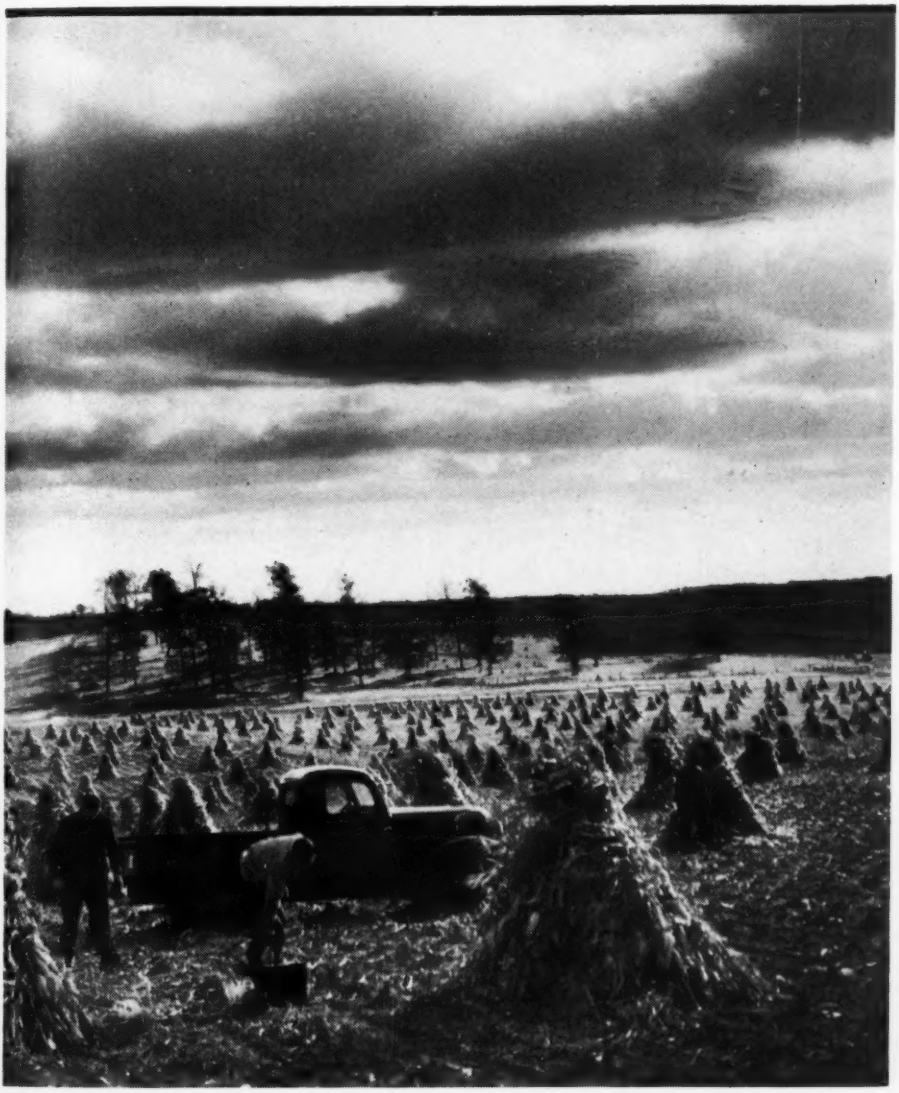

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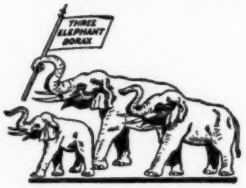

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VOLUME XXX NO. 9

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READY TO "STRIKE" AGAINST AMERICAN HOLIDAYS

Better Crops with PLANT FOOD

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VOL. XXX WASHINGTON, D. C., November 1946 No. 9

Cataloging Our . . . . .

Cluttered Calendars

Jeff McDermid

AN authority on dates and celebrations informs me that we now possess at least sixty special weeks named for certain observances and campaigns, some of which bear startling and unique titles. This vast schedule surely gives us something extra to do every week in the whole year, plus eight more weeks for good measure—all of which helps to find an excuse not to pay grocery and rent bills on the first of each month, being so busy observing this and that. Moreover it appears that we also have nearly an equal number of red-letter days on which to work and ponder for profound, patriotic, or puerile purposes.

When I was a supposed innocent youngster, indifferent to all other needs than bare necessities, the old calendar near the clockshelf had only five official dates for us to remember and give pause to in our round of labor and refreshment. They were New Years, Washington's Birthday, Fourth of July, Thanksgiving, and Christmas.

I do not recall that we were ambitious enough in those primitive times to stretch our imaginations over entire weeks of dedication and inspiration. I will, of course, make due exception here to revival meetings, teachers' institutes, terms of court, mercantile bargain days, the county fair, hog-killing week, corn-planting week, and maybe a spell of farmers' institutes. We were too stultified and prosaic perhaps to envision the dire need we should have for felt hat day in October, straw hat day in June, gum-for-digestion week, prunes-for-slow-bowels week, dress-up day, know-your-neighbor month, international good-will week, theft-preven-

tion day, discourage-borrowing week, bank-your-bonds day, donut-dunking week, and so on through the list.

Nowadays nobody can come out with celebration and observance statistics as I have been without sticking his neck out, because of a good chance that a dozen or more brand new ones have been adopted by state legislatures, congress, or the amalgamated workers organizations, or even some of the farmer co-operatives, who have been bitten hard by the publicity and proclamation bug with almost as violent a reaction as the urban campaign hounds.

I know positively that my treasured list of freak anniversaries and stimulation-begetting events, put into dynamic form by means of days and weeks of specialization is completely archaic and outmoded. Every 24 hours some bright group of energetic people with budgets to speed them forward are closeted in some office or hall hatching up another significant commodity or project to decorate the billboards with and use for national promotion.

SOME of us on the sidelines regard this with shades of tolerance or disdain, while no small segment of our citizens pack everything they have into fleeting and temporary support of, or acquiescence in, many of these motley observances.

It fits very well on sundry occasions into the programs of radio stations or the copy-shops of newspapers. When there are no handy murders, society scandals, political campaigns, or atom-bomb tests to feature, the calendar of odd observances is a neat adjunct to a lean and tiresome interval. Moreover as most of them have some commercial appeal or advertising significance, there is that extra fillip to spur publicity efforts in their behalf.

Meanwhile where does this leave us old codgers who have made up our minds not to chase fads and scramble on ballyhoo bandwagons? Speaking frankly for that moss-grown generation, our reaction sums up about thus: Why not have fewer and better things to celebrate, use some definite date to launch them, and then keep at it indefinitely? I grant you that such a method would rub out the observance of straw-hat day, furnace-cleaning week, or plant-a-garden week because obviously you couldn't possibly go on indefinitely with these seasonal pepper-uppers. But you can pick out any of the holidays and observances, except the birthdays and historical anniversaries, and triple the value of the thought behind it by continuous, patient, and conscious efforts to conform to its symbolism.

I know, for instance, that most always I am never very thankful or appreciative of having more calories than the underprivileged except at the advent of the last Thursday in November. At that time I gorge myself full of fine foods with six times the calorie intake of European eaters and sleep it off pronto. On the next day I find myself grumbling at the wife because she hasn't got the right knack with her kitchen range or the beef bootlegger; and I howl hard because there is no butter at my plate in the Rush & Roach restaurant—not only the next day, but right on almost up to Christmas, which shames me a bit and sobers down my fretfulness for awhile.

Somewhat chastened and solemn, I do my Christmas shopping early (in the morning) and sneak the bundles home with a weather eye on Dec. 25. On Dec. 24 I break out in feeble smiles, read old Scrooge again, or listen to Lionel Barrymore's perennial presentation of the Christmas Carol. Then maybe I give the kids fifty cents for their Sunday school poor basket and then wonder what I'm going to get for what I gave. I forget to growl much about the menu during these holidays because there's no reason to, for Ma has laid up enough goose grease and confectionery to last for a considerable stomach siege.

Yet this spell of good humor doesn't last any longer than it takes to rip off

December from the calendar, disclosing frigid January and February, bereft of any hints of brotherly love and thankfulness. All that cold weather makes folks huddle selfishly.

Obviously, I am in no shape at New Years to adopt the Chinese custom of paying all my debts and getting square, after expending so much in solicitude for others at Christmas. Neither am I in a mood to retain any high percentage of my New Year resolutions, so blandly assumed that day in deference to the calendar.

PROCEEDING further as the months roll by, we find many other dates on which to embark on some great and noble enterprise within the limits of some specified interval, duly publicized lest we overlook the obligation or the opportunity.

January begins with four special observances to get me into good training for stiffer assignments just beyond. Potato and Onion Week comes between the 17th and 26th. It was thought up by the Idaho Chamber of Commerce, regardless of the benefit it might give to Maine as well. This is surely one year when we ought to bake, fry, boil and casserole every spud in sight, because otherwise the Government will be obliged to dispose of them for potable alcohol again. If somebody would only step forward now with the glorious meat gravy bowl plumb-filled to the brim, I could double my intake of tubers without halting for breath on the 26th.

I am somewhat stumped by the sight of Large Size Promotion Week, beginning on January 18. I am finding it hard to observe that one as I boast only a size 14½ collar and potatoes without the above-named gravy are not going to increase my bulk fast enough. I must write to New York for more details on how to promote larger sizes, especially in winter when everything contracts so much in zero weather.

Next on the January docket is Peanut Week, from the 23rd to 27th. Somebody in Atlanta was not satisfied with the goober consumption rate, although in picking my purchases of fancy mixed nuts I find fully 80 per cent of them to be peanuts of the long brown or redskin kind. But I reckon that my new artificial ivories set in rubberoid will see me through the week's crunching. One more week only remains in January—Youth Week, starting on the 27th. If I thought the kids wouldn't resent my intrusion, I'd go with them to a few dances or juke-box huddles, or offer to help them with their algebra. As far as trying to regain a fling of my own youth, I desist from experience. It's too far gone for that.

For a short month, February offers me more than its share of periods of note. Aside from the two memorable birthdays commonly observed within this last winter month, we have three "Days" and three "Weeks" to study up on. Ground Hog Day on the 2nd instant passes more uneventfully for city exiles than it once did when we lived in the country close to the lairs of the hibernators. St. Valentine brings me less thrill and heart throb than it did in far-off school days when I sent comic slams to the meanies and cupid cards to the lassies. However,

(*Turn to page* 50)

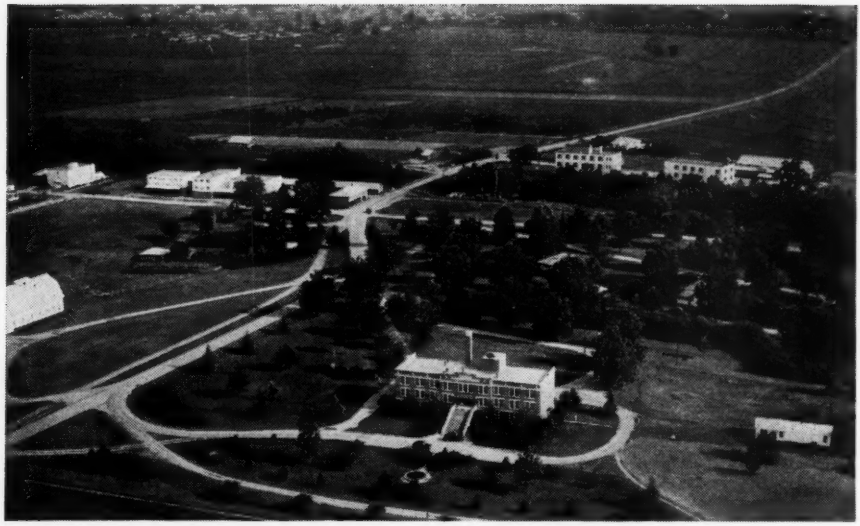

Fig. 1. Delta Experiment Station and Cotton Ginning Laboratory in background.

Mechanical Production of Cotton in the Yazoo-Mississippi Delta

By J. E. Adams and P. W. Gull

Delta Branch Experiment Station, Stoneville, Mississippi

THE use of power equipment for production of cotton in the Mississippi section of the Delta has been both widespread and increasing over a period of years. Loss of labor to the war industries greatly stimulated interest in the problem at a time that availability of equipment diminished. Realization that the spindle-type cotton harvester is a reliable farm implement came during that period; that, coupled with the fact that labor is not returning to the cotton fields, has thrown the problem of elimination of hand labor in cotton production into bold relief.

Even under the system of one man, one mule, and half-row equipment, any labor unit is able to produce more cotton than it can pick, and power equipment increases this unbalance. A plentiful supply of mechanical pickers will, of course, materially alter the situation. With a total of 130 to 140[1] man hours per acre formerly required to produce an acre of cotton, the 80 to 85 hours consumed in picking are reduced to approximately 5 per acre. Unless production technique is improved, the

Acknowledgment is made to J. W. Neely, Sidney G. Brain, and Wm. E. Meek, members of the Delta Station staff, and T. L. Baggette, former member, for the agronomic and engineering phases of the program.

[1] Welch, Frank J., and Miley, D. Gray. Mechanization of the Cotton Harvest. Miss. Expt. Sta. Bull. 420, p. 9. June 1945.

producer will have to carry extra labor for production, where in the past it was carried for picking of the crop.

The thinning of cotton to a stand and control of grass and weeds in the growing crop must be as completely mechanized as possible in order to offset the change in labor balance induced by mechanical picking. Where topography allows, cross-plowing of cotton, either planted or plowed out to a checked stand, materially reduces the hoe labor required for weed and grass control. Hill dropping to a stand eliminates the thinning operation, as does checking or cross-plowing, with an added advantage of a substantial saving of seed, but requiring more hoe labor for weed and grass control. There remains, however, a residuum of hand labor required for grass and weed control, even where cross-plowing can be practiced, that should be eliminated by mechanical means in so far as possible.

Mechanization undoubtedly will aid the producer to stay in business, but profits will also depend upon high yields of a uniform product in sufficient volume and quality to allow efficient manufacture. Adequate use of fertilizer, based on soil and plant needs, and judicious use of cover crops and good seed of an adapted variety of cotton, must be combined with efficient production methods. The most economical use of the mechanical harvester depends on large yields, as cost of operation is based on acreage covered. Only large yields allow a low cost per bale for picking.

Research Facilities at Stoneville

Any production program is not complete unless the effects on processing and marketing are studied simultaneously. An unusual combination of facilities for coordinated research is available at Stoneville, Mississippi, and advantage of these has been taken. The only experimental ginning laboratory in the United States, a unit of the Bureau of Plant Industry, Soils, and Agricultural Engineering, is located at Stoneville. (See figure 1 for view of Delta Station and Ginning Laboratory in background.) The engineering phases of the work are under Charles A. Bennett. F. L. Gerdes is in charge of the fiber and cottonseed testing laboratories of the Cotton Branch of Production and Marketing Administration. When a special appropriation was made in 1944 by the Mississippi Legislature, as a result of the farsighted program of Dr. Clarence Dorman, Director of the Mississippi stations, responsibility for the mechanization of cotton and other crops studies was assigned to Delta Branch Station. Delta Station has all facilities needed for the agronomic and breeding phases of the problem. Cost studies in cooperation with plantations having mechanical pickers have been carried on by Frank J. Welch and Gray D. Miley of the agricultural economics section of the main station.

Mechanization Technique

Mechanization of cotton production must be planned for when the stalks are broken and the winter cover crop is turned if it is to make complete use of all implements now available. Flat-breaking has several advantages, such as good coverage of cover crop and trash and ease of drainage. Middle-breaking is, however, as cheap a plowing operation as can be had. There is an added advantage in that a firm seedbed aids in getting a stand, particularly in fields having both light and heavy soils.

Successful planting and cultivation depend on beds both evenly spaced and of even height. This condition cannot be attained with a two-row middle-breaker. The three-row breaker, using a marker, prepares beds suitable for subsequent use of two- or four-row planting equipment. If power is limited, the rear plow is dropped and the machine operated as a "skip-row" type breaker.

Beds are worked down at planting so

Fig. 2. Two-row "Dixie" cotton chopper.

that the cotton if not planted on the level is on an extremely low bed. This is essential if either the area is to be cross-plowed to a check stand or if the flame is to be used later for weed and grass control, or both.

If for any reason cross-plowing or hill-dropping is not desirable and it is necesary to drill and thin to a stand, mechanical chopping will have to replace hand labor. Four choppers have been compared at the Delta Station: The one- and two-row, tractor-drawn Dixie (figure 2); a one-row machine developed by the Finklea Implement Company, Leland, Mississippi (figure 3); and the flame chopper (figure 4). The Dixie chopper does very well for small cotton when soil conditions are ideal; this is true also for flame chopping, with an added advantage in that some control of small grass and weeds around stalks left in the "hill" or "block" is obtained. This control has been pronounced in some tests. Flame chopping is accomplished by mounting open-end metal boxes, spaced on 20-inch centers, on a wheel; the boxes are about 5 inches wide, 8 inches long, and 10 inches high. Burners are directed toward the row from each side, and the wheel is rolled down the row, the boxes protecting the plants as the wheel rotates. The flame destroys small plants of all kinds not protected by the boxes, spacing the hills at 20 inches. Four-row flame choppers have been used in 1946.

The Finklea chopper consists of a rotating shaft paralleling the row, powered by a wheel driven by traction with the ground; thus the rotation of the shaft is synchronized with ground speed. A bar is mounted perpendicular to the shaft with a hoe attached to each end of the cross-bar. The machine operates best when drawn by the tractor operating at highest speed. This machine shows greatest adaptability of any of the three tested in that it will not only thin or "chop" cotton of the size-range handled by the flame and Dixie choppers, but is the only one tested that will satisfactorily chop cotton larger than four to six inches in height.

The ease and efficiency of mechanical thinning, regardless of the machine, are dependent to a great extent upon planting operations. A good stand is necessary, of course, as a machine is not selective as is hand hoeing. Beds, if used, must be uniformly spaced and

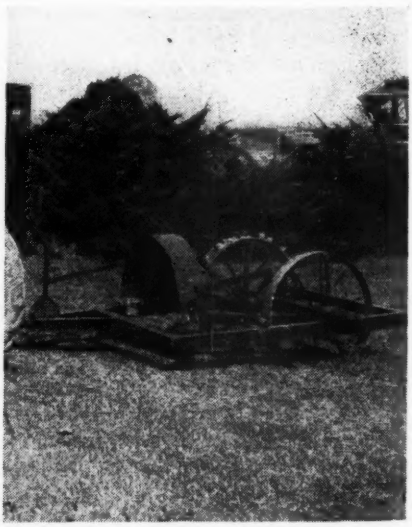

Fig. 3. One-row Finklea cotton chopper.

uniform in height. Flame chopping, like cross-plowing, to a checked stand is best accomplished when cotton is planted flat. It would seem that with these points in mind practically as much attention should be given to leveling of land for mechanical farming in the Delta as is given to the irrigated and mechanized sections of the Southwest.

Evenly spaced rows, combined with proper planting, greatly aid early cultivation. The use of a gang of four "rotary hoes" (figure 5), otherwise known as "picker wheels" mounted on an axle attached to the front tool-bar so that each gang operates independently and is "floating" on the bed, speeds up early cultivation. Developed at Hopson Planting Company, the unit is mounted between the inside sweeps and operates on and to about four inches on either side of the row of young plants. Acting to break up any crust and as a rotating fender, two-leaved cotton can be cultivated at the maximum speed of the tractor. Although cultivation at five miles per hour gives satisfactory results, it is thought that six to seven miles per hour would be somewhat better. Efficient use of the principle of the rotary hoe depends on speed attained only with the rubber-mounted tractor. Cotton as tall as six inches has been successfully cultivated with this attachment; the two inside wheels can be removed and the two outside wheels used as a fender for larger cotton, if desired. Throwing the clods back to the "middle," allowing only pulverized soil to filter in around the plant, helps to keep the bed flat and even, so necessary for subsequent flaming. High-speed sweeps, set flat, with all cultivation done at the front of the tractor, are used. All flaming is done behind the tractor. Four-row equipment to allow simultaneous cultivation of middles and flaming of rows has been in operation since early 1945.

Fig. 4. Two-row flame chopper using oil-air type burners.

Flaming of cotton for weed and grass control has been practiced since 1943[2] at Delta Station. Cotton must be about 3/16 inch in diameter at the crown before it will stand the temperature

[2] Neely, J. Winston, and Brain, Sidney G. Control of weeds and Grasses in Cotton by Flaming. Miss. Agr. Expt. Sta. Circular 118. March 1944.

Fig. 5. Rotary hoe shield unit, or rotary tiller.

of 1800 to 2000° F. of the flame passing the plant at 2½ to 2¾ miles per hour. Burners are set 4 to 6 inches from the row at an angle of about 15 degrees with respect to the ground level so that the flame passes the stem of the plant, skimming the bed and spreading into the middle beyond the row. With two burners to the row, one from either side, they are set so that the flames do not oppose each other, as this would cause them to flare up into the plant and scorch the leaves. More recently, use of four burners to the row has allowed use of third gear, or approximately 4¼ miles per hour.

Machines manufactured in 1946 use either propane or butane as fuel and do not require a compressor. A two-row experimental machine (figure 6) developed during the latter part of the 1945 season used propane, drawing vapor from the top of the tank. Successful use of butane requires either a vaporizer or the self-energizing type of burner. The self-energizing burner in which fuel is vaporized by circulating within a shell forming an integral part of the burner lends itself to use of more than two burners per row with increased speed for flaming.

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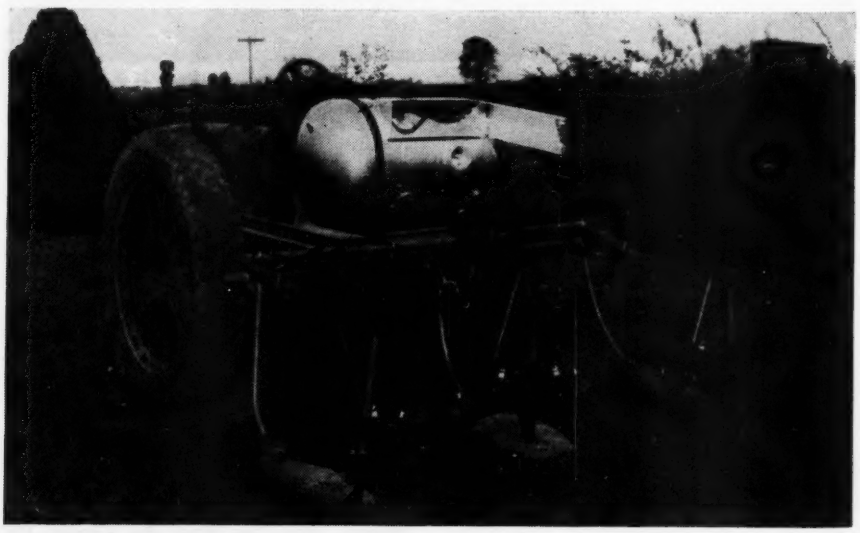


Fig. 6. An experimental two-row flame cultivator for use of compressed gas.

Fertilizer Inequalities . . . Can They Be Corrected?[1]

By T. B. Hutcheson, M. H. McVickar and S. S. Obenshain

Virginia Agricultural Experiment Station, Blacksburg, Virginia

ONE of the first studies undertaken by a great many of the agricultural experiment stations was that centered around the establishment of rotation-fertility plots. The data collected from these experiments have furnished much of the information on which our fertilizer and rotation recommendations are based. These same experiments have provided the material on which much of our basic knowledge in soil chemistry, soil physics, soil microbiology, and related fields has been secured.

There are many agricultural workers who feel that the long-time rotation fertility plots have furnished the information for which they were designed and therefore should be discontinued. On the other hand, there are investigators who maintain that there still remain unsolved problems which can be answered best by these old long-time experiments. Those who belong to the latter school maintain that with modification of the experimental procedure a new set of values can be established for the experiments.

One has only to review the fertilizer usage trends to see that for years phosphate, in addition to lime where needed, was thought to be the principle nutrient necessary for maintaining or increasing crop yields. Long-time experiments have shown the fallacy of this assumption, and results reported by farmers support the most recent research findings. In the Old Rotation Fertility Plots, located at Blacksburg, Virginia, and established in 1914, no response was received from potash for years after the study was started. However, in recent years the yields from the plots receiving no potash or an insufficient quantity of potash have declined rapidly. More recent experiments with alfalfa show very similar results.

As agricultural science advances and more information is gained concerning plant nutrition, the function of these nutrients in plants, and the behavior of the so-called fertilizer constituents in the soil, the question that naturally arises is—how should soils be treated where an unbalanced nutrient condition exists? It has been assumed that the deficient nutrients should be added in liberal amounts, but experimental data to support this hypothesis are lacking. The Old Rotation Fertility Experiment afforded an excellent opportunity to secure information bearing on this assumption.

From 1914 to 1941, inclusive, many of the plots had received heavy annual applications of fertilizer ingredients in unbalanced proportions. Starting in the spring of 1942 the Agronomy Staff altered the experimental layout so that data could be obtained on the effectiveness of different methods and on the time required to correct the unbalanced conditions. Figures 1 and 2 show the layout of the experiment as it formerly was and as it now exists.

The data reported have been collected from some of the plots of the Old Rotation Fertility Experiment, located on a

[1] Published with approval of the Director of Virginia Agricultural Experiment Station.

Fig. 1:- Plan of Experiment 1914 to 1941 inclusive

0-70-0 (2)	Check
40-70-100 (1),(2),(3)	Check
40 70 -0 (4),(5)	Check
0-70-100 (2),(3)	Check
0-0-100 (3)	Check
40-0-100 (1),(3)	Check
40-70-0 (1),(2)	Check
40-0-0 (1)	Check
16 Tons Manure *	Check
16 Tons Manure* 0-70-0 (2)	Check
4 Tons Manure †	Check
16 Tons Manure * 0-70-0 (2)	Check
0-70-0 (2)	Check

Fig. 2:- Plan of Experiment since 1941

0-70-0 (2)	Residual	40-0-100 (1),(3)	Fertilizer Ratio Δ	Check	Fertilizer Ratio Δ
40-70-100 (1),(2),(3)	Resid	0-36-18 (2),(3)	F-R	Check	F-R
40-70-0 (1),(2)	Resid	0-0-100 (3)	F-R	Check	F-R
0-70-100 (2),(3)	Resid	6-36-18 (2),(3),(4)	F-R	Check	F-R
0-0-100 (3)	Resid	10-70-0 (1),(2)	F-R	Check	F-R
40-0-100 (1),(3)	Resid	0-70-0 (2)	F-R	Check	F-R
40-70-0 (1),(2)	Resid	0-0-100 (3)	F-R	Check	F-R
40-0-0 (1)	Resid	0-70-100 (2),(3)	F-R	Check	F-R
16 Tons* Manure	Resid	0-70-0 (2)	F-R	Check	F-R
16 Tons* Manure 0-70-0 (2)	Resid	8 Tons* Manure	F-R	Check	F-R
4 Tons† Manure	Resid	2 Tons† Manure 0-70-0 (2)	F-R	Check	F-R
16 Tons* Manure 0-70-0 (2)	Resid	8 Tons* Manure	F-R	Check	F-R
0-70-0 (2)	Resid	40-0-100 (1),(3)	F-R	Check	F-R

(1) N from Uramon : (2) P_2O_5 from Superphosphate : (3) K_2O from 50% Muriate : (4) N from Ammonium Sulfate : (5) P_2O_5 from Raw Rock Phosphate :

* Manure applied once every 4 years before corn :

† Manure applied annually.

Δ Fertilizer Ratio experiment superimposed on Check – not discussed in this paper.

Dunmore silt loam soil. This soil was developed from the weathering of limestone and is one of the more productive upland soils in Virginia. It has a grayish-brown topsoil with yellowish-brown or slightly yellowish-red subsoil, and usually has a depth of from four to ten feet above bed-rock. The plots were located at Blacksburg, Virginia, at an elevation of about 2,100 feet above sea level.

In 1914* a four-year rotation of corn, wheat, and two years of hay was established. Fertilizer treatments employed are given in table 1. Plots were not duplicated but adjacent to each treated plot was an unfertilized check plot. Yields, as reported, have been adjusted on the basis of the yields from the uniform check. Both the fertilized and the check plots have received finely ground raw dolomitic limestone at the rate of one ton per acre every fourth year. This amount of lime has maintained a soil reaction of about pH 6.7. Each crop in the rotation appears each year.

In the spring of 1942 each fertilized plot of the Old Rotation Fertility Ex-

*This experiment was in progress from 1909-1913 inclusive. The plots received identical treatments listed in table 1 but only one-half the amounts.

This picture shows vegetation on a plot receiving an annual application of 40-0-0.

periment was divided into three 1/50 acre sections. (See figure 2.) Section 1 remains unchanged and continues to receive the same annual fertilizer treatment that has been applied since 1914. Section 2 was designed for a "Residual-Effect Study" and has not received any fertilizer since 1942. Of course, from 1914 to 1942 this section received the identical treatment of Section 1. Section 3, the "Revised Treatment Section," received fertilizers in the same amounts and kinds as Section 1 until 1942, but since this date has been fertilized according to treatments under "Revised Treatment Section" in table 1.

Picture of a plot which received from 1914-42 identical treatments as the one shown above. Since 1942, it has received an annual application of 0-70-100.

Four years' data have been collected and furnish a basis for the study undertaken; namely, Fertilizer Inequalities . . . Can They Be Corrected?

The variation in yields obtained from the original fertilization plots show, beyond a doubt, that inequalities exist among the plots used in this study. Since the only variable from 1914 to 1942 was that of fertilization, it can be assumed that these inequalities are due, eithed directly or indirectly, to the difference in fertilizer application. The variation between the highest and lowest yielding plot is given in table 1 for each crop in all three sections. These data serve as a good measure of the degree of inequality that exists.

In the section still receiving the treatments started in 1914, the differences between the highest and lowest yielding plots are large. On an acre basis, yields vary in this section as follows: Corn, 73.3 to 41.3 bushels; wheat, 23.7 to 5.8 bushels; clover-timothy hay, 4,096 to 1,941 pounds; and mixed hay 4,288 to 2,598 pounds. These data would indicate that of the crops studied wheat is one of the most sensitive to soil inequalities. The effect of soil inequalities is not uniform or identical for the different crops studied, although the use of nitrogen alone for a long period has resulted in the lowest yields of the crops grown. Likewise with the exception of corn, the plot with complete fertilization has yielded higher than any other plot.

The yield of corn was 13.4 bushels greater in the "Residual Section" than the same plot in the "Original Treatment Section" where the annual application was 40-70-0. Likewise, the plot which received 0-70-100 yearly yielded 6.0 bushels less than the same plot receiving no fertilizer since 1941. These two cases were the only exceptions where yields were significantly greater in the "Residual Section" than in the "Original Treatment Section." Time alone apparently does very little to even out inequalities resulting from past unbalanced fertilization. This is reflected by the variation in the yield which still exists between the plots in the "Residual Section." Some progress seems to have been made as far as corn yields are concerned.

In all but two cases (and here the

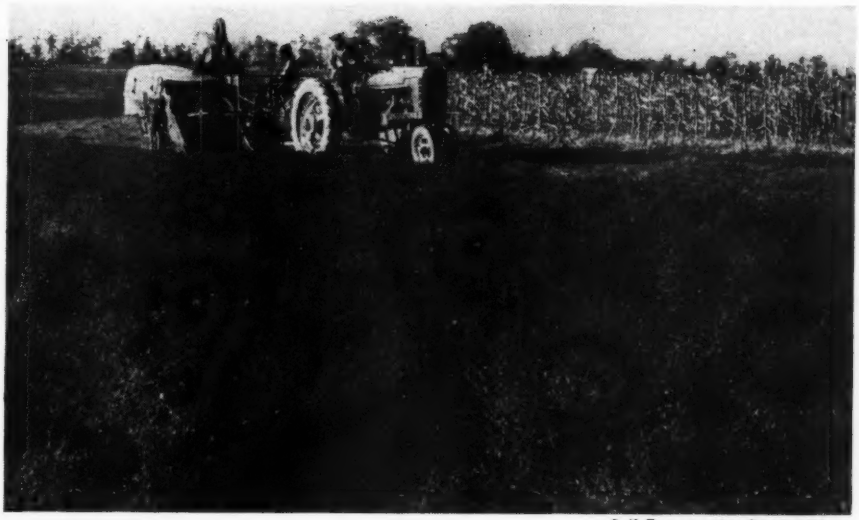
(*Turn to page* 41)

TABLE 1.—AVERAGE ANNUAL YIELD OF CORN, WHEAT, FIRST YEAR HAY, AND SECOND YEAR HAY—OLD ROTATION FERTILITY EXPERIMENT, 1942-45, INCLUSIVE.[1]

Original Treatment Section					Residual Section					Revised Treatment Section				
Fertilizer treatment Acre basis	Yield				Fertilizer treatment	Yield				Fertilizer treatment[2] Acre basis	Yield			
	Corn	Wheat	1st year hay	2nd year hay		Corn	Wheat	1st year hay	2nd year hay		Corn	Wheat	1st year hay	2nd year hay
	Bu/A	Bu/A	Lb/A	Lb/A		Bu/A	Bu/A	Lb/A	Lb/A		Bu/A	Bu/A	Lb/A	Lb/A
40–70–100	62.4	23.7	3562	4288	Plots received	52.5	21.7	3053	4123	0–36–18	62.7	19.9	3166	4460
0–70–0	57.7	22.0	2448	3143	original fertil-	60.3	20.2	2445	2961	40–0–100	70.2	27.2	3507	3797
40–70–0	47.5	14.3	4096	2627	iser treatments	60.9	12.8	2874	2181	0–0–100	71.6	21.2	5052	2772
0–70–100	68.7	18.5	7213	3925	from 1914–1941	73.7	24.5	7131	4445	6–36–18	70.7	21.6	7821	5025
40–0–100	50.6	12.1	3583	3691	inc. Since 1941	54.3	12.6	3043	2757	0–70–0	70.1	18.2	5856	4885
40–0–0	41.7	5.8	1941	2598	no additional	44.5	5.5	1468	2272	0–70–100	88.7	12.8	3699	4225
0–0–100	73.3	7.9	3480	2829	fertiliser treat-	63.1	6.4	3508	2148	40–70–0	88.2	15.2	7317	3333
					ments have been made.									
Maximum yield....	73.3	23.7	4096	4288		73.7	24.5	7131	4445		88.7	27.2	7317	4885
Minimum yield....	41.7	5.8	1941	2598		52.5	5.5	1468	2148		62.7	12.8	3166	2772
Mean yield	57.3	14.9	3760	3300		58.5	14.8	3360	2984		74.6	19.4	5203	4071

[1] Yields reported to have been adjusted on basis of uniform check.

[2] From 1914 to 1941, inclusive, same as original treatments; starting in 1942, plots have received treatment listed.



Soil Conservation Service Photo

John M. Brown, Piedmont, South Carolina, harvesting lespedeza seed from a neighbor's field. The early application of potash makes possible a hay crop in July and a crop of seed from the same land in October. This fits into the small grain-hay-seed lespedeza program discussed in this article. Some farmers prefer to apply a strong potash fertilizer to small grain at seeding time. They claim this gives lespedeza an earlier start.

Using Potash in Soil Conservation

By W. G. Lowry

Agricultural Adjustment Administration, Charlotte, North Carolina

THE Government's 1946 Agricultural Conservation Program for North Carolina includes among others a practice for applying potash materials to perennial or biennial legumes, perennial grasses, annual lespedeza, and crotalaria. Mecklenburg County chose to keep this practice along with eight others in our County Program. We regard the application of potash to lespedeza as a more important practice from a standpoint of soil improvement and volume of productivity than the practice allowed for lespedeza seeding. Our experience shows that many acres of lespedeza and other legumes will be seeded but that a comparatively small percentage will have potash applied. It is necessary that our farmers be educated to the value of this fertilizer in a legume and grass program.

Most farmers are not interested in the chemical make-up of potash materials, but are very interested in the results that may be obtained through their use. We have learned that potash may be expected to give certain results in plant growth. They may be briefly listed in the following manner:

1. Increases vigor.
2. Helps plants resist disease.
3. Gives strong stalks.
4. Increases plumpness of grains and seed.

5. Helps production of sugars, starches, and oils.
6. Gives better quality of product.

Methods for applying potash are the same as for applying any other fertilizer. As a goal, however, the more evenly the material is spread over the soil, the better the results obtained.

This spring many farmers saw the results of using a strong potash fertilizer on their grain carried over to their lespedeza crop. There have been instances reported to me in which this was demonstrated beyond a doubt. One case was in a field where 2-12-12 fertilizer was used until it gave out; then 3-12-6 was used to fertilize the rest of the field. The farmer reported that there was a clearly evident line showing in that field exactly where the 2-12-12 fertilizer ended and the other was substituted. He told me that where the potash was used the lespedeza was every bit of twice as tall, more vigorous and showed no signs of the drought. The other was dwarfed and turned brown in spots.

We have learned in this county that the continued cutting of lespedeza for hay takes potash out of the ground. This shows that it takes potash to make good lespedeza—that it is one of the plant foods necessary to produce this legume. Therefore this material should be added to lespedeza fields each year. Do not neglect the use of lime about every five years, and do not leave off the phosphate any year, but be sure to put some potash on the lespedeza fields every year. This should be done whether the crop is cut for hay, turned under for green manure, or left on the land as a temporary mulch and cover crop. Several of our most progressive farmers say that they have been cutting their lespedeza for hay at an early stage —say the last of July or the first of August—and then having a bumper crop for seed in late September or early October. It is generally known that the smaller lespedeza and the later crops of this legume produce more seed in proportion to the foliage than the earlier and more lush growths. Potash helps make such a profitable lespedeza program possible.

Very often the addition of 100 pounds of muriate of potash, or its

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Soil Conservation Service Photo

Richard Puckett, Route 9, Charlotte, North Carolina, harvesting a meadow hay mixture. Lime, phospate, and potash were applied to this land and a good yield was obtained from land rather steep to row crop.

Soil Requirements For Red Clover

By H. J. Snider

Department of Agronomy, University of Illinois, Urbana, Illinois

SOIL requirements for red clover are not so high as for alfalfa and sweet clover, although red clover is sensitive to soil deficiencies and responds accordingly as these deficiencies are corrected. Shortages of certain fertility elements in soils are the cause of most red clover failures in areas where this crop flourishes. These failures may consist of either an insufficient stand, lack of a satisfactory yield when a desirable stand is secured, or failure to produce hay and forage with desirable feeding quality.

Red clover is one of the most important hay, forage, and soil improvement crops over a large part of this continent. Regarding this legume Dr. A. J. Pieters says, "Red clover is one of the most important and most widely known of all cultivated legumes. Either alone or in mixtures with other plants, chiefly timothy, it is the most used forage and soil-improving crop throughout northern and central North America and Europe and its culture as a rotation crop extends beyond these boundaries."

Red clover has long been used as a farm crop throughout the eastern and midwestern sections of this country. Dr. Pieters says that it is not known definitely when it was brought to America, but there are records of it being grown in this country as early as 1747. E. N. Fergus is authority for the statement that red clover was brought from Pennsylvania to central Kentucky in 1803. This was probably its first appearance west of the Allegheny mountains.

Red clover is especially adapted for various crop rotations and flourishes in a variety of mixtures of other legumes and grasses. The red clover-timothy mixture is an old standard and this combination has been responsible for the production of many tons of beef, pork, dairy products, and horse power on farms throughout the land. Aside from its productive possibilities as a feed, it has enriched many acres of land and consequently increased the yield of many acres of crops. It has also saved many tons of valuable top soil from being transported to the low lands and also retarded the building up of deltas of various streams of the nation.

Red Clover Needs Phosphorus and Potassium

A great deal has been written about the effects of acid soils on the red clover crop and a less amount has been said about the effect of phosphorus and potassium deficiencies on this crop. There has been a tendency among practical men in the Midwest to assume that when the acidity of soils was corrected by liming the principal soil deficiency was cared for and red clover should flourish on all limed land. It becomes increasingly evident that available phosphorus and potassium must also be supplied when these elements are deficient in soils if red clover is to make the most in yield and give the highest feeding quality in hay and forage.

Red clover in Illinois responds rather remarkably to potash treatment on land deficient in available potassium. It has frequently given substantial increase in yields on soils not considered especially deficient in this element.

TABLE 1. YIELD AND COMPOSITION OF CLOVER HAY ON SOILS OF HIGH AND LOW AVAILABLE POTASSIUM CONTENT.

Soil Treatment	Hay lbs/A	Per cent		
		Protein	P	K
Easton 90 pounds*				
SP	790	16.1	.17	1.47
SPK	2210	15.9	.15	1.92
Toledo 80 pounds*				
LrP	3500	19.1	.24	1.01
LrPK	4180	18.2	.23	2.61
Elizabethtown 180 pounds*				
LrP	2540	16.8	.19	1.92
LrPK	3180	18.0	.20	2.51
Joliet 200 pounds*				
LrP	3940	16.8	.24	1.34
LrPK	4040	16.9	.21	2.18

* Amounts available potassium in untreated soil. Red clover except Toledo field was alsike. Muriate of potash applied: Easton, 400 pounds on wheat, clover seeded in wheat. Toledo, 200 pounds on wheat. 100 pounds on corn, 100 pounds on clover. Elizabethtown, 200 pounds on wheat, 200 pounds on corn, 100 pounds on clover. Joliet, 200 pounds on wheat, 100 pounds on corn, 100 pounds on clover.

This is apparent from the results in table 1, where on soils containing only 80 to 90 pounds available potassium an acre there were 680 and 1,420-pound increases respectively in hay yield where muriate of potash was applied to the land. There was an increase of 640 pounds hay an acre on the Elizabethtown field where muriate of potash was applied. The available potassium content of this soil was as high as 180 pounds an acre. Potash treatment had been followed for a number of years on this field and evidently had been helpful also in building up the much needed organic matter supply in this eroded hill land.

Potash treatment on the Dixon experiment field gave increased red clover hay yields each of the three successive years indicated in table 2. This field is on Muscatine silt loam which contains

TABLE 2. RED CLOVER HAY YIELD AND COMPOSITION THREE DIFFERENT YEARS ON THE DIXON FIELD.

Soil Treatment	Hay lbs/A	Per cent		
		Protein	P	K
	1943			
LP	2020	16.2	.21	1.14
LPK	2720	16.4	.20	1.96
	1944			
LP	2880	19.0	.19	1.30
LPK	3400	17.0	.18	1.90
	1945			
LP	2820	21.0	.24	1.70
LPK	3080	21.0	.20	2.31

Muriate of potash applied 100 pounds for corn, 200 for wheat, and 100 on oat stubble for clover.

Red clover grown on Illinois Corn Belt soils has been found to contain potassium equivalent to 100 lbs. of 50% muriate of potash in a ton of dry hay. This important soil improvement crop may rob the land of a very essential element.

about 170 pounds an acre of available potassium and as a rule is not considered in need of potash fertilizers. The gain in hay yield on this field which may be attributed to the 100 pounds of muriate of potash varied from 260 pounds up to 700 pounds an acre or an average of 510 pounds for the three years. In addition there is to be considered the second crop and the additional organic matter added by the larger clover growth.

It is of interest and of considerable value to note the distribution of the amounts of dry matter and percentages of various elements in the stems, leaves, and bloom of the red clover plant at hay stage. Stems make up the largest proportion of the hay, 56%, compared to 39% leaves and 5% bloom (table 3). The clover blossoms are relatively rich in nitrogen, phosphorus, and potassium, but make up such a small percentage of the total bulk as to be rather insignificant in the feeding value of the hay. Leaves are relatively high in nitrogen, phosphorus, and calcium, while the stems are relatively low in these important elements. It may be readily seen that red clover could be converted from a high protein to a relatively low protein hay through the loss of a large part of the leaves during hay-making operations.

On the basis of the percentages presented in table 3 approximately 60% of the potassium in the red clover hay

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TABLE 3. COMPOSITION OF RED CLOVER LEAVES, STEMS, AND BLOOM, AVERAGE OF FIVE SAMPLINGS, JUNE 15-19, 1945.

Part of Plant	Per cent of total	Percentage					
		N	P	K	Ca	Mg	Fe
Leaves	39	3.50	.17	1.87	2.17	.42	.004
Stems	56	1.48	.11	2.14	.89	.32	.004
Bloom	5	2.83	.23	2.32	.92	.28	.002

Crop Requirements For Available Potash

By Eric Winters

Agronomy Department, University of Tennessee, Knoxville, Tennessee

"WHAT kind of fertilizer should I use—and how much?" farmers often ask.

For a satisfactory answer, the fertility of the soil and the fertility requirements of the crop to be grown are important things to know. Then if the soil fertility is deficient in any respect for that crop, the kind and amount of fertilizer necessary to overcome the deficiency can be recommended.

In recent years chemical methods have been proposed for evaluating the fertility, or "available" nutrient content, of soil samples. When the results of such chemical tests can be correlated with crop yields on the fields from which the soil samples were taken, a sound basis for predicting fertilizer needs of this crop on similar soils is provided.

Several years ago field experiments with corn, cotton, dark-fired tobacco, alfalfa, and Irish potatoes were started in Tennessee to determine their response to potash fertilization at different levels of "available" potash in the soil. Three treatments were given each field experiment—no potash, a medium potash application, and a heavy application. All plots, except in the case of alfalfa, were given uniform applications of nitrogen and phosphate to eliminate any serious deficiency of these two critical materials.

Soil samples were collected from each plot area before any fertilizer was applied. "Available" potash was determined on the samples by a modification of the chemical analysis method suggested by R. H. Bray of Illinois. The method chosen measures the exchangeable soil potassium which is presumed to represent the "available" potassium in the soil.

During a four-year period beginning in 1940, 60 field experiments were completed. The data obtained are summarized in Table 1. The levels of exchangeable soil potassium used in grouping the data for Table 1 were selected tentatively after preliminary inspection of the results. Thus, 150 lbs. per acre (75 ppm) are designated as a medium level and 200 lbs. per acre as a high level of exchangeable potassium. Only in the case of corn were there sufficient data to justify three groups in the summary.

Results

The average yields of the no-potassium plots are given in column 4 of Table 1. Except in the case of corn, the soils with the higher exchangeable potassium gave the higher yield. In the case of corn, 11 of the 16 experiments where the exchangeable soil potassium is below 150 lbs. were located in Carter County. Carter County lies in the extreme northeast section of Tennessee where soil and climatic conditions differ from those in other parts of the State. Therefore, the average yields for the Carter County experiments and those outside Carter County were computed separately for these soils low in potassium, and the former are shown in parentheses in Table 1. Only two of the remaining 14 corn experiments were located in Carter County, and their effect on the average yields for the soils containing more than 150 lbs. of available potassium can safely be neg-

lected. If only the corn data outside Carter County for the soils low in potassium are considered, then the correlation between yield of corn and exchangeable potassium is comparable to that observed with other crops.

Average Yield Response to Fertilization

The average yield increases from potash fertilization are given in column 6 of Table 1. They are greater in every case on the soils with the lower exchangeable potassium. The appreciable average yield responses for those corn experiments where the exchangeable soil potassium exceeded 200 lbs. were due in each case to one exceptional experiment. The averages omitting these single experiments are given in parentheses. It will be noted that the yield on the check plots of the soils low in exchangeable potassium, plus the increase in yield with the larger increment of potash, approximately equals the yield on the check plot of the soils high in exchangeable potassium. Since very little increase resulted from potash fertilization on these high potash soils, it can be safely assumed that sufficient potash was supplied by the higher rates of application so that it was not an important factor limiting yield under the conditions of these experiments. Another point worth noting is the operation of a law of diminishing returns with the larger increment of potash. This also suggests that the larger amount of potash added is approaching the maximum

TABLE 1.—AVERAGES OF CHECK PLOT YIELDS AT DIFFERENT LEVELS OF EXCHANGEABLE POTASSIUM AND AVERAGE YIELD INCREASES FROM POTASSIUM FERTILIZATION

Crop	Exchangeable K in soil Lbs. per acre	No. of field trials	Average yield of check plots	Increment of K_2O Lbs. per acre	Average yield increase per acre
Corn	Under 150	16	53.6 bu. (58.3)[1] (33.8)[2]	25 75	8.5 bu. 11.2 bu.
	150 to 200	10	41.9 bu.	25 75	3.5 bu. 7.0 bu.
	Over 200	4	52.8 bu.	25 75	3.1 bu (1.3)[3] 4.9 bu (−0.5)[3]
Irish potatoes	Under 200	4	80.0 bu.	50 150	37.5 bu. 49.5 bu.
	Over 200	3	136.0 bu.	50 150	5.6 bu. −2.3 bu.
Alfalfa	Under 150	5	1.89 tons	50 150	.53 ton 1.02 tons
	Over 150	3	3.20 tons	50 150	None None
Cotton	Under 200	6	977 lbs. (seed cotton)	25 75	177 lbs. seed cotton 272 lbs. seed cotton
	Over 200	3	1266 lbs. (Seed cotton)	25 75	23 lbs. seed cotton 120 lbs. seed cotton
Dark-fired tobacco	Under 200	3	221 dollars	50 150	31 dollars 49 dollars
	Over 200	7	242 dollars	50 150	−3 dollars 10 dollars

[1] Average for Carter Co. [2] Average excluding Carter Co. [3] Average for three trials.

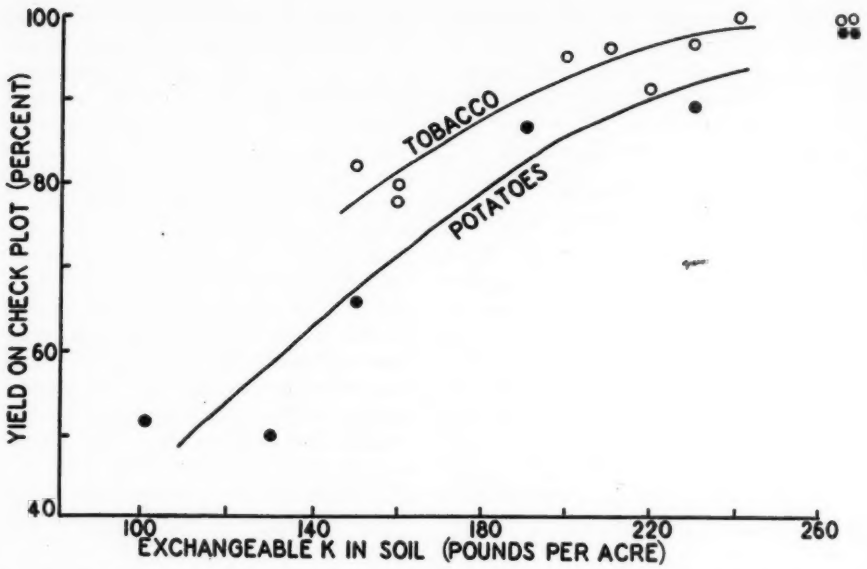

Fig. 1. Relationship between exchangeable potassium and yields of tobacco and Irish potatoes on check plots receiving no potash.

that could be used by the crops under the conditions of these experiments.

Yield Response Graphs for Each Crop

Another way of presenting data of this type graphically in order to bring out other significant relationships has been suggested by Bray. The yield on the plot receiving the high potash increment is taken as 100%, and the yield on the check plot is computed as a percentage of this yield. Then the response of a given crop to potash fertilization from a number of experiments may be plotted on the same graph where the percentage yield of the check plot is represented in the vertical direction, and the exchangeable soil potassium is represented in the horizontal direction.

Figure 1 presents the data for dark-fired tobacco and Irish potatoes graphed in this fashion. A smooth curve has been fitted approximately to the points for each crop to show the trends. It is at once clear that the potash requirement for potatoes is greater than that for tobacco, since for any given level of exchangeable potassium, the percentage yield for tobacco is higher than for potatoes.

The data for the 30 corn experiments have been graphed in a similar fashion in Figure 2. The points for the Carter County experiments have been differentiated from the others. The upper broken curve shows the trend for the Carter County data. The lower broken curve shows the trend for the other data. The solid curve shows the general trend of all corn data.

The yield response curves for all crops studied have been assembled in Figure 3. The curves for alfalfa and cotton are less reliable than the others because they are based on fewer and less consistent data.

Relative Potassium "Requirements" of Crops

Except for alfalfa, the curves in Figure 3 are all similar in general shape but they differ in respect to their positions on the graph. The relative potassium "requirement" of each crop may be inferred from this positional

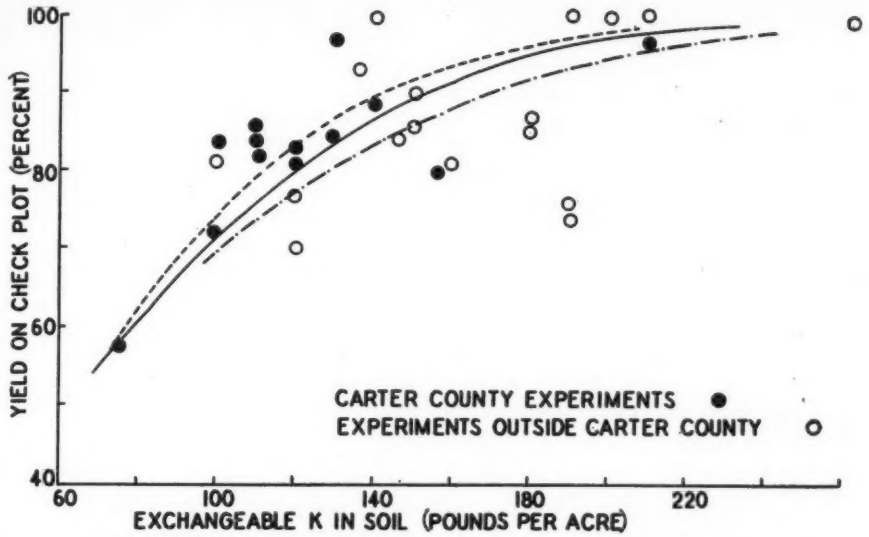

Fig. 2. Relationship between exchangeable potassium and corn yields on plots receiving no potash.

difference by comparison of the soil content of available potassium at some suitable yield level, say 90%. In this region the curves, except for alfalfa, are tending to level out. The approximate potassium requirements in pounds per acre for a 90% yield are as follows: corn, 155; alfalfa, 160; cotton, 185; dark-fired tobacco, 190; Irish potatoes, 220.

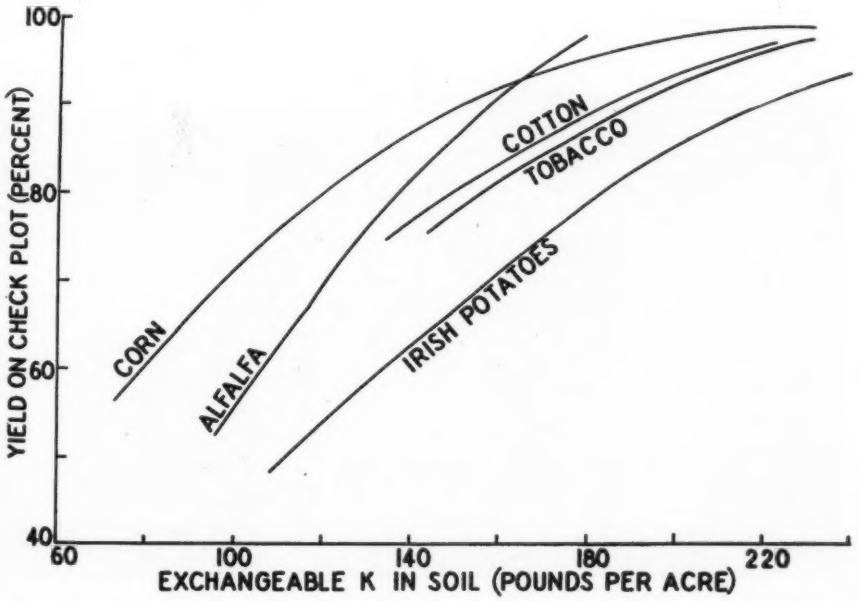

Fig. 3. Relationship between exchangeable potassium and yields of five crops on check plots receiving no potash.

Other Data on Yield Responses of Crops to Potash Fertilization

Bray has recently published a yield response curve for corn. Comparison of this curve with Figure 2 shows the two curves to be very similar. The scatter of points in Figure 2, however, is somewhat greater than in Bray's graph, and the potassium requirement at the 90% yield level is smaller, being 155 lbs. as compared to 180 lbs. These differences are not surprising in view of the variations of soil and climatic conditions between Tennessee and Illinois.

Three other recent studies which contained all the soil and crop data necessary for the preparation of yield response curves have been published. The resultant graphs are not reproduced here, but the points of major interest brought out by comparison of these graphs with those in Figure 3 will be presented.

The data on cotton obtained by C. D. Hoover in Mississippi gave a curve very similar to the one for cotton in Figure 3. The potassium requirement at the 90% yield level is 180 lbs., which is in close agreement with 185 lbs. in this study. The soil and climatic conditions under which Hoover's data were collected are fairly comparable to those of the cotton belt of Tennessee, so the close agreement in response is not surprising.

L. C. Olson's data on cotton were obtained in Georgia. Most of the soils had low exchange capacities of about three milli-equivalents with only a few as high as five or six milli-equivalents. This is in contrast to capacities of five to 12 milli-equivalents or more for most of the soils in the Mississippi and Tennessee studies on cotton. The curve for cotton obtained from Olson's data is comparable to the others above 160 lbs. of exchangeable soil potassium, but at lower values it is more nearly horizontal. Thus at 90 lbs. of available soil potassium the graph of Olson's data indicates a yield level of 70%, while in the case of the graph of Hoover's data the yield level is only 50%. This indicates a higher availability of potassium to cotton in soils of lower exchange capacity.

The data on soybeans obtained by W. L. Nelson and W. E. Colwell in

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Fig. 4. Corn at right received no potash; the row of taller corn received 25 lbs. of potash (K_2O). Fullerton soil very low in exchangeable potassium (50 lbs. per acre).

Three Thousand Miles to Market

By E. R. Jackman

Extension Specialist in Farm Crops, Oregon State College, Corvallis, Oregon

SOMEONE defined a seed as "a small plant, packaged for shipping." Each year millions and hundreds of millions of these tiny plants move from the state of Oregon by all possible routes to the 13 southern states. The South rather strangely gets its cover crop seeds from Oregon, which is about as far away as one can get and still stay in the United States. If 1,650 freight cars were loaded to 80,000 pounds, they would just about hold the annual southern movement of these seeds from Oregon. The money value of this transcontinental diagonal movement is about $8,000,000.

The crops involved are Austrian Winter peas, Willamette vetch (pronounced to rhyme with dammit, not silhouette), common vetch, Hungarian vetch, and common ryegrass. Oregon grows many other seed crops also, but these make up the bulk of this unique cross-country business.

They are used in the South mainly for cover crops—to nail down the soil during the winter and to impart to it the life-giving nitrogen. It is not always understood that most of the southern problems are born of the soil.

The main trouble comes from the same source as the energy of the atomic bomb—the sun. We are inclined to look at all tropical lands and the near tropics as places of marvelous fertility where one plants a seed and jumps back; where the jungle covers by night as much land as a man can clear by day. But, as many of our soldiers found when detailed to raise gardens in the South Pacific, a hot sun on bare ground does things that are all bad. The sun burns out the organic matter and the organic matter is the only source of nitrogen.

So the lands of the South are the same as the coral islands of New Guinea—dreadfully shy of nitrogen. Most of the southern states raise more acres of corn than cotton, but take a look at a meager set of statistics below, deliberately shortened and simplified to avoid dullness:

Area	Average Corn Yield 1932–41	Total Corn Acreage Harvested
7 states farthest south (Alabama, Mississippi, Louisiana, Texas, Florida, Georgia, South Carolina)	13.2 bushels per acre	19,629,000
7 northern corn belt states (Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa)	38.1 bushels per acre	35,032,000

And yet, with the long growing season, plenty of summer moisture, and farmers trained to row-crop farming, the South succeeds time after time in capturing personal and individual acre national yield laurels. One can raise more corn per acre in the South than elsewhere, but in order to do so, the commercial fertilizer must be piled on. The South incidentally uses more commercial fertilizer per acre than the Mid-

west by several times over. In 1943, the last year for which I have seen the figures, the southern states above (minus Texas) averaged 330 lbs. of commercial fertilizer per harvested acre, while the corn belt states used an average of 28 pounds.

So we come back to the southern soil and the sad lack of nitrogen. That nitrogen must be supplied either by commercial fertilizer or by cover crops or both. The use of one does not erase the need for the other. As the nitrogen need became apparent to thoughtful southerners about 50 years ago, they experimented with every known legume and soon found that legumes would not do well in most places without phosphate, lime, and often potash. In order to correct the glaring nitrogen defect, it was often necessary to invest heavily in other elements.

At first the vetches and peas were bought in Europe, but the supplies were uncertain, of poor quality, and difficult to get when needed. Oregon jumped into the picture about 20 years ago and started to ship south in quantity. Why Oregon? Because this state has that most rare of climatic combinations, cool summers without rain, cool to promote slow ripening and plump seeds, and dry for uninterrupted harvests.

Expanded Rapidly

Acreage expansion, at first slow and spasmodic, received a boost from the AAA soil improvement program. The groundwork had been laid by years of careful experimental work in all of the southern states. County agents were prepared to tell people exactly where they could seed each kind of cover crop, how much to seed, when to seed, how to fertilize, and when to turn it down.

It had been demonstrated that continuous cover cropping tended to build up yields, or give a cumulative effect. Thus the second five years of a cover crop program usually produced more corn or cotton per acre than the first five years, whereas with commercial nitrogen, or "sto' bought nitrogen" there was no such bonus yield.

The cover crops had other advantages: prevention of erosion, of course, and use for pasture and hay. The "sto' bought nitrogen" could hardly compete in these uses.

At any rate, the cover crop acreage in Oregon responded generously to the stimulus of the AAA program and later to the still greater needs fostered by the war-time nitrogen shortage. Here is the over-all acreage of all of these crops grown in Oregon for seed:

Year	*Acreage all Cover Crops in Oregon*
1930	30,100
1935	71,900
1940	251,200 (AAA boost)
1942	387,000 (War-time needs)

Since then acreage has slumped due to removal of support prices on peas and because of insect troubles with hairy vetch. In many western Oregon counties one acre out of every four is still in these cover crop seeds, and in the 150-mile length of the Willamette Valley, no matter what road one travels, he is never out of sight of a seed field.

Of all the cover crops used in the South, hairy vetch gets the nod over competitors. On southern farms it will grow on dry soils where peas fear to tread; it will thrive on soils so acid that other vetches and peas never even start; it will survive sudden blasts from cruel north winds that send other shivering crops below ground; and it is the all around foolproof crop. Its cold resistance can be gauged by the fact that the only state outside of Oregon that historically has been a consistent seed producer is Michigan.

Unfortunately, from a seed producer's standpoint the hairy vetch is the bad boy of the group. Seed shatters with eager haste to do its own harvesting, drastically limiting the acreage on any one farm; a sudden hot spell of 90° or more may blast the blooms and reduce

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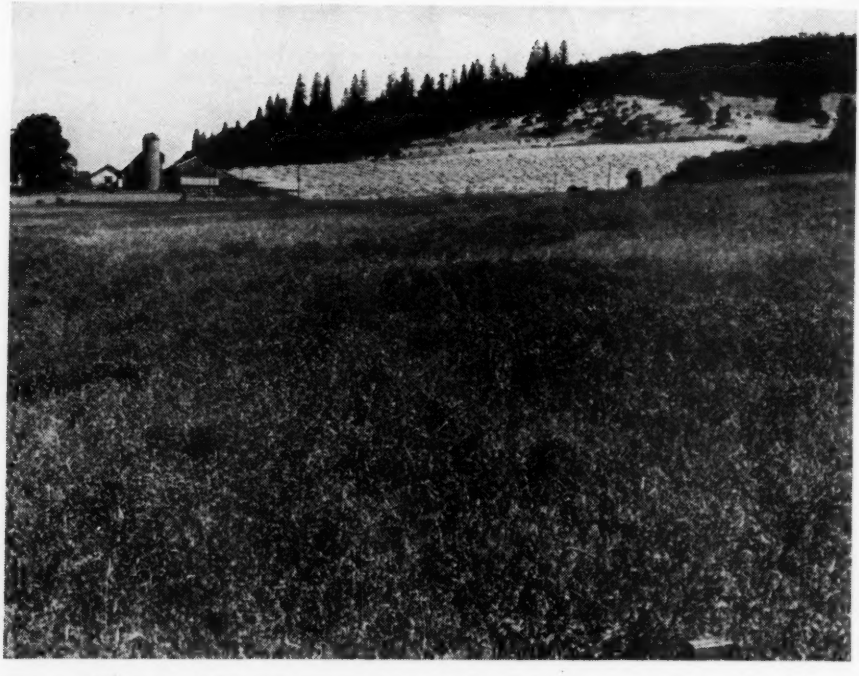
The rich purple blooms of hairy vetch make a colorful countryside in Oregon in June.



Above: A Willamette Valley seed farm with hairy vetch in the foreground nearly ready for harvest.

Below: The Federal-State Laboratory at Corvallis tests more seed samples than any other laboratory in the U. S.

Above: In Lincoln County, Mississippi, a farmer inoculates his seed of winter peas from Oregon.

Below: Cotton in the famous Delta country of Mississippi following soil-enriching crop of winter legumes.

Above: Dusting hairy vetch for weevil control. Nearly the entire Oregon acreage was dusted in the spring of 1946.

Below: This barren hillside clearly shows the deep erosion which inevitably results from row cropping on steep land.

The Editors Talk

A New National Soil Association

A little vague, perhaps, to most people only a few years ago, the words "soil conservation" have now come to mean one of the greatest national projects for maintaining this country's wealth and power and recognized as the concern of everyone. Announcement of the formation of a National Association of Soil Conservation District Governing Officials in August of this year is therefore to be welcomed as another means not only of awakening public consciousness but of greater efficiency within the project.

The new association explains its background as stemming from the dust storms of the mid-thirties and the increasing soil erosion which aroused the Nation to the need for combatting this menace. Conservation research was strengthened and watershed demonstration projects and CCC camps were established throughout the country to show farmers how to control soil erosion with crops best adapted to good land use. Out of these experiences grew the knowledge that responsibility for conservation work must rest with local farmers and ranchers.

To accomplish this, state legislatures in 1937 began to pass soil conservation district laws, patterned after a national model, authorizing the establishment of soil conservation districts under time-honored democratic processes of petition, referendum, and election. A soil conservation district is an organization of farmers, by farmers, for farmers, and is a local subdivision of a state, set up under the laws of the state in which it lies. It is organized and run by farmers and ranchers to protect farm and ranch land from erosion, conserve rainfall, and improve productivity. It is authorized to ask and receive help from state, federal, and local governments and from private sources. The Soil Conservation Service and other federal and state units and private sources furnish technical and other aid to districts.

Between 1937 and mid-June 1946, farmers and ranchers had formed over 1,600 soil conservation districts in 48 states. These districts included more than 3,800,000 farms—over two-thirds of the farms and ranches in the country—containing over 800,000,000 acres. Additional districts are being formed at a rapid rate. District governing officials have organized state associations in two-thirds of the states of the Union. These officials found that state associations of members of district governing bodies enabled them to develop better methods for managing the districts. They then felt the need for a national association to do a similar job on a national scale.

Representatives of soil conservation districts from 32 states met in Washington in January 1946 and instructed E. C. McArthur of Gaffney, S. C., President

of the South Carolina Association, to form a committee to organize a national association. This committee of 18 met in Chicago in July, adopted a constitution, and elected a temporary board of directors—one from each of the seven geographical divisions of the country. The temporary Board then elected Mr. McArthur President and R. L. Rutter, Jr., of the Kittitas Soil Conservation District of Washington, Vice-president. Other states represented on the Board of Directors include Texas, Colorado, Kansas, Ohio, and Maine. Other states represented on the Committee were Alabama, Louisiana, Kentucky, Michigan, Indiana, Maryland, Nebraska, West Virginia, Minnesota, and Arizona.

The National Association is to be a non-profit, non-partisan organization formed to accelerate the effective functioning of soil conservation districts as democratically organized and operated public instrumentalities, through which landowners and operators may work cooperatively in effectuating the conservation and wise use of the Nation's soil and water resources. Its more specific purposes are:

a. To facilitate the exchange of information, knowledge, and experience among soil conservation district governing bodies.

b. To collect, compile, and disseminate information relating to the organization and effective functioning of soil conservation districts.

c. To further the functioning of State Associations, or other organized groups of members of soil conservation district governing bodies.

d. To advance generally the organization and functioning of soil conservation districts, including matters relating to applied sciences, processes of administration, and management arts used by them.

An organization actively carrying out the four purposes listed above should be able to perform a substantial service in strengthening soil conservation work throughout the country. It is to be hoped that this new Association will succeed in developing a well-rounded program based on these purposes, and its activities will be watched with interest.

Thanksgiving

Our All-American holiday has a deeper meaning in store for it this year. Events of the past few years have made individuals more keenly aware of their everyday blessings. Things like freedom and peace and health are more than words in songs, more than words of grace spoken over the roast turkey. They have come to life with a personal and present feeling.

This Thanksgiving will be more than a recounting of our personal benefits. A keener edge has been put upon our sympathy for the less fortunate, and our prayers are including them. We are more interested in the brotherhood of man and hopeful for its greater recognition. But recognition will not come with the wishing for it; recognition comes with a day-in and day-out living of ideals—an earnest pursuit of the principles we deem worthwhile.

Let us appreciate the abundance that is ours, but let us also find the time and the occasion to manifest in actual deeds the thoughts that come to mind as we say our Thanksgiving prayer.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1920.....	15.9	17.3	125.3	141.7	61.8	182.6	16.46	25.65	....
1921.....	17.0	19.5	113.3	113.1	52.3	103.0	11.63	29.14	....
1922.....	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	40.8	149.0	192.0	109.0	141.0	16.40	52.70	....
1945									
October.....	22.30	45.9	126.0	180.0	113.0	151.0	14.30	51.00	....
November....	22.52	46.7	131.0	186.0	111.0	153.0	14.90	51.30	....
December....	22.84	43.8	137.0	194.0	109.0	154.0	15.40	51.40	....
1946									
January.....	22.36	36.3	145.0	208.0	110.0	154.0	15.70	50.90	....
February.....	23.01	33.9	146.0	223.0	111.0	155.0	15.80	50.30	....
March.....	22.70	31.9	157.0	236.0	114.0	158.0	16.30	47.50	....
April.....	23.59	42.9	162.0	245.0	116.0	158.0	15.00	48.00	....
May.....	24.09	43.0	157.0	251.0	135.0	170.0	14.80	49.60	....
June.....	25.98	59.0	147.0	251.0	142.0	174.0	14.70	51.50	....
July.....	30.83	56.7	148.0	275.0	196.0	187.0	15.00	60.00	....
August.....	33.55	48.6	143.0	280.0	180.0	178.0	15.10	59.10	....
September...	35.30	48.8	128.0	224.0	173.0	179.0	15.40	57.80	....
Index Numbers (Aug. 1909—July 1914=100)									
1920.....	128	173	180	161	96	207	139	114	....
1921.....	137	195	163	129	81	117	98	129	....
1922.....	185	228	95	114	116	109	98	135	....
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	408	214	219	170	160	138	234	212
1945									
October.....	180	459	181	205	176	171	120	226	181
November....	182	467	188	212	173	173	126	227	235
December....	184	438	197	221	170	174	130	228	223
1946									
January.....	180	363	208	237	171	174	132	226	249
February....	186	339	209	254	173	175	133	223	275
March.....	183	319	225	269	178	179	137	211	283
April.....	190	429	232	279	181	179	126	213	282
May.....	194	430	225	286	210	192	125	220	177
June.....	210	590	211	286	221	197	124	228	185
July.....	249	567	212	313	305	212	126	266	163
August.....	287	486	205	319	280	201	127	262	162
September...	285	488	184	255	269	202	130	256	154

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.59	5.16
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945						
October	1.75	1.42	7.81	5.77	4.86	6.71
November	1.75	1.42	7.81	5.77	4.86	6.71
December	1.75	1.42	7.81	5.77	4.86	6.71
1946						
January	1.75	1.42	7.81	5.77	4.86	6.71
February	1.75	1.42	7.81	5.77	4.86	6.71
March	1.75	1.42	7.81	5.77	4.86	6.71
April	1.75	1.42	7.81	5.77	4.86	6.71
May	1.75	1.42	9.08	6.10	4.86	7.30
June	1.88	1.42	10.34	6.42	4.86	7.90
July	1.88	1.42	11.62	8.15	5.34	9.60
August	2.22	1.46	17.15	8.14	6.07	12.14
September	2.22	1.46	10.60	6.95	6.07	12.14
Index Numbers (1910-14=100)						
1922	113	90	173	132	140	142
1923	112	102	177	137	136	147
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945						
October	65	50	223	163	144	191
November	65	50	223	163	144	191
December	65	50	223	163	144	191
1946						
January	65	50	223	163	144	191
February	65	50	223	163	144	191
March	65	50	223	163	144	191
April	65	50	223	163	144	191
May	65	50	259	173	144	207
June	70	50	295	182	144	224
July	70	50	332	231	158	273
August	83	51	490	231	180	345
September	83	51	303	197	180	345

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1922	.566	3.12	6.90	.632	.904	23.87	....
1923	.550	3.08	7.50	.588	.836	23.32	....
1924	.502	2.31	6.60	.582	.860	23.72	....
1925	.600	2.44	6.16	.584	.860	23.72	....
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.570
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945							
October	.650	2.20	6.28	.535	.797	26.00	.200
November	.650	2.20	6.40	.535	.797	26.00	.200
December	.650	2.20	6.40	.535	.797	26.00	.200
1946							
January	.650	2.20	6.40	.535	.797	26.00	.200
February	.650	2.20	6.40	.535	.797	26.00	.200
March	.650	2.20	6.40	.535	.797	26.00	.200
April	.650	2.20	6.40	.535	.797	26.00	.200
May	.650	2.20	6.40	.535	.797	26.00	.200
June	.650	2.30	6.45	.471	.729	22.88	.176
July	.650	2.60	6.60	.471	.729	22.88	.176
August	.700	2.60	6.60	.471	.729	22.88	.176
September	.700	2.60	6.60	.471	.729	22.88	.176
Index Numbers (1910-14=100)							
1922	106	87	141	89	95	99	....
1923	103	85	154	82	88	96	....
1924	94	64	135	82	90	98	....
1925	110	68	126	82	90	98	....
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945							
October	121	61	129	75	84	108	83
November	121	61	131	75	84	108	83
December	121	61	131	75	84	108	83
1946							
January	121	61	131	75	84	108	83
February	121	61	131	75	84	108	83
March	121	61	131	75	84	108	83
April	121	61	131	75	84	108	83
May	121	61	131	75	84	108	83
June	121	64	132	66	76	95	80
July	121	72	135	66	76	95	80
August	131	72	135	66	76	95	80
September	131	72	135	66	76	95	80

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1922	132	149	141	116	101	145	106	85
1923	143	152	147	114	107	144	103	79
1924	143	152	143	103	97	125	94	79
1925	156	156	151	112	100	131	109	80
1926	146	155	146	119	94	135	112	86
1927	142	153	139	116	89	150	100	94
1928	151	155	141	121	87	177	108	97
1929	149	154	139	114	79	146	114	97
1930	128	146	126	105	72	131	101	99
1931	90	126	107	83	62	83	90	99
1932	68	108	95	71	46	48	85	99
1933	72	108	96	70	45	71	81	95
1934	90	122	109	72	47	90	91	72
1935	109	125	117	70	45	97	92	63
1936	114	124	118	73	47	107	89	69
1937	122	131	126	81	50	129	95	75
1938	97	123	115	78	52	101	92	77
1939	95	121	112	79	51	119	89	77
1940	100	122	115	80	52	114	96	77
1941	124	131	127	86	56	130	102	77
1942	159	152	144	93	57	161	112	77
1943	192	167	150	94	57	160	117	77
1944	195	176	151	96	57	174	120	76
1945								
October	199	182	154	97	57	175	121	78
November	205	182	156	97	57	175	121	78
December	207	183	156	97	57	175	121	78
1946								
January	206	184	156	97	57	175	121	78
February	207	185	156	97	57	175	121	78
March	209	187	158	97	57	175	121	78
April	212	188	160	97	57	175	121	78
May	211	192	162	99	57	189	121	76
June	218	196	163	100	60	203	121	70
July	244	209	181	103	60	230	121	70
August	249	214	187	116	67	296	131	70
September	243	210	181	108	67	226	131	70

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] **Since June 1941, manure salts are quoted F.O.B. mines exclusively.**

**** The weighted average of prices actually paid for potash are lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizer

"Annual Report for the Calendar Year 1945," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., Oct. 1945.

"Spinach Fertilizer Experiments," Div. of Truck Crops, Univ. Farm, Davis, Calif., T. C. Mimeo. No. 37, 1946.

"Fertilizers for 1947," The Maritime Fertilizer Council, Moncton, N. S., Canada.

"Annual Report, State Chemist of Florida, Yr. end. Dec. 1945, Pt. I: Fertilizers," Chem. Div., Agr. Dept., Tallahassee, Fla.

"Fertilizer Materials Used in Florida for Fiscal Year July 1, 1945, thru June 30, 1946," Fertilizer Stat. Div., Bu. of Insp., Tallahassee, Fla.

"Liming the Soil to Increase the Yield of Cotton," Agr. Exp. Sta., Experiment, Ga., Pr. Bul. 572, Aug. 16, 1946, L. C. Olson and R. P. Bledsoe.

"County Fertilizer Data: Mixed Goods and Materials, July 1, 1945 through June 30, 1946," St. Dept. of Agr., Jackson, Miss.

"Poultry Manure and How to Use It," Ext. Service, N. J. State College of Agr., Rutgers Univ., New Brunswick, N. J., Ext. Bul. 241, April 1946, H. R. Cox.

"Ohio Law Relating to Sale of Agricultural Liming Material," Div. of Plant Ind., Dept. of Agr., Columbus, Ohio.

"Summary of Fertilizers and Fertilizer Materials Sold in South Carolina," Clemson Agr. College, Clemson, S. C., Aug. 30, 1946, B. D. Cloaninger.

"Fertilizer Tests with Cotton and Corn at the El Paso Valley Substation, 1943-45." Substation No. 17, Ysleta, Texas, P. R. 993, Mar. 11, 1946, P. J. Lyerly.

"Effect of Phosphates upon the Percentage of Phosphoric Acid in Pasture Grasses," Agr. Exp. Sta., Texas A & M, College Station, Texas, P. R. 996, Mar. 23, 1946, J. F. Fudge and R. R. Lancaster.

"Distribution of Fertilizer Sales in Texas, July 1-Dec. 31, 1945," Agr. Exp. Sta., Texas A & M, College Station, Texas, P. R. 998, Apr. 9, 1946, J. F. Fudge.

Soils

"General Summary of Soil Experiment Field Results—Joliet, AG 834; Dixon, AG 835; Clayton, AG 836; Aledo, AG 837; Carthage, AG 838; Carlinville, AG 839a; Kewanee, AG 840; Oquawka, AG 841; McNabb, AG 842; Mt. Morris, AG 843; Minonk, AG 844; Hartsburg, AG 845; Brownstown, AG 953; Toledo, AG 1023; Newton, AG 1096a; Enfield, AG 1096b; West Salem, AG 1096c; Ewing, AG 1096d; Dixon Springs, AG 1096e; Raleigh, AG 1096f; Lebanon, AG 1096g; Oblong, AG 1096h; Sparta, AG 1096i; Elizabethtown, AG 1096j; Bloomington, AG 1145; Antioch, AG 1146; Urbana, AG 1150 Rev.;" Agr. Exp. Sta., Univ. of Illinois, Urbana, Ill., May 1946, F. C. Bauer, A. L. Lang, M. H. Nelson, L. B. Miller, P. E. Johnson, C. J. Badger, and C. H. Farnham.

"Directions for Collecting Soil Samples from a 40-Acre Field," Dept. of Agron., Univ. of Illinois, Urbana, Ill., M-397, Feb. 1946.

"Soil Conservation Districts in Indiana," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., Leaf. 233 (2nd Rev.), 1946.

"Experiments in the Control of Soil Erosion in Central New York," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 831, Apr. 1946, G. R. Free, E. A. Carleton, John Lamb, Jr., and A. F. Gustafson.

"Orchard-Site Selection," N. Y. State College of Agr., Cornell Univ., Ithaca, N. Y., E. Bul. 697, June 1946, Damon Boynton.

"Publications of G. S. Fraps and Work of Division of Chemistry Texas Agricultural Experiment Station 1903-1945," Agr. Exp. Sta., Texas A & M, College Station, Tex., P. R. 958, Sept. 10, 1945, A. D. Jackson, Editor.

"Economic Land Classification of Grayson County," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Bul. 392, Mar. 1946, G. W. Patteson and Z. M. K. Fulton, Jr.

"Some Soil Properties Which Influence the Use of Land in West Virginia," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Bul. 321, Sept. 1945, R. M. Smith, G. G. Pohlman, and D. R. Browning.

Crops

"Growing Alfalfa on Sand Mountain," Agr. Exp. Sta., Alabama Polytechnic Inst., Auburn, Ala., P. R. 3 (Rev. July 1946), R. C. Christopher.

"Forty-seven Years of Experimental Work with Grasses and Legumes in Alaska," Agr.

Exp. Sta., Univ. of Alaska, College, Alaska, Bul. 12, Nov. 1945, Don L. Irwin.

"Blackeye Beans in California," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Bul. 696, Feb. 1946, W. W. Mackie.

"Citrus Culture in California," Agr. Ext. Ser., Univ. of Calif., Berkeley, Calif., Cir. 114, Jan. 1940 (Rev. Feb. 1946), R. E. Caryl (Rev. by J. C. Johnston).

"Hays and Hay Making in the Prairie Provinces," Dominion Exp. Farm, Brandon, Manitoba, Can., Publ. 722, Aug. 1946 (Rev.), M. J. Tinline.

"Horticultural Experiment Station, Report for 1943-1944," Ontario Hort. Exp. Sta., Vineland Sta., Ont., Can., 1945.

"Azalea Culture for Florida," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., P. Bul. 621, April 1946, R. J. Wilmot and R. D. Dickey.

"Winter Pasturing and Feeding of Cattle," Ga. Exp. Sta., Experiment, Ga., P. Bul. 570, July 24, 1946, O. E. Sell and Z. A. Massey.

"Growing Small Grains," Ga. Exp. Sta., Experiment, Ga., P. Bul. 573, Aug. 19, 1946, U. R. Gore and J. G. Futral.

"Four Field Crop Rotations," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1288, Dec. 1945, F. C. Bauer.

"Helps for the Home Garden," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., E. Bul. 238 (4th Rev.), 1946, W. B. Ward.

"Indiana Peach Production," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., E. Bul. 322, 1946, C. L. Burkholder and Clarence E. Baker.

"Ornamental Shrubs, Their Planting and Care," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., E. Bul. 324, R. B. Hull.

"The Retting of Hemp: I. Field Retting of Hemp in Iowa," Agron. Sect., Iowa State College, Ames, Iowa, Res. Bul. 342, May 1946, W. H. Fuller, A. G. Norman, and C. P. Wilsie.

"The Retting of Hemp: II. Controlled Retting of Hemp," Agron. Sect., Iowa State College, Ames, Iowa, Res. Bul. 343, May 1946, W. H. Fuller and A. G. Norman.

"The Retting of Hemp III. Biochemical Changes Accompanying Retting of Hemp," Agron. Sect., Iowa State College, Ames, Iowa, Res. Bul. 344, May 1946, W. H. Fuller and A. G. Norman.

"The Home Lawn," Agr. Exp. Sta., Iowa State College, Ames, Iowa, E. Bul. P80, April 1946, H. L. Lantz, L. C. Grove, and E. P. Sylwester.

"Fifty-eighth Annual Report, Agricultural Experiment Station of University of Kentucky," Lexington, Ky., 1945.

"Burley Tobacco Project for 4-H Clubs," Agr. Ext. Div., Univ. of Ky., Lexington, Ky., Cir. 412, Jan. 1946, E. J. Kinney.

"Guide to Planting Forest Trees," Agr. Ext. Div., Univ. of Ky. Lexington, Ky., Leaf. 101, Jan. 1946, W. E. Jackson.

"Identification of Blueberry Varieties by Plant Characters," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 431, May 1946, John S. Bailey and Arthur P. French.

"Fifty-second Annual Report, Agricultural Experiment Station, University of Minnesota, July 1, 1944-June 30, 1945," University Farm, St. Paul, Minn.

"Flower Gardening," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 306, March 1946, J. E. Smith, Jr.

"Production of Vegetable Plants," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 308, March 1946, Aubrey D. Hibbard.

"Alfalfa Seed Production," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., Cir. 168, June 1946.

"Common Red Clover in Nebraska," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., Cir. 169, June 1946.

"Planting and Caring for the Lawn," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Bul. 724, March 1946, Gilbert H. Ahlgren.

"Fifty-sixth Annual Report, Agricultural Experiment Station, New Mexico College of Agriculture and Mechanic Arts," State College, N. M., 1944-1945.

"Apple-Tree Pruning Wounds Treatment and Healing in Sound and Winter-Injured Trees," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 821, Oct. 1945, D. S. Welch and L. H. MacDaniels.

"Better Wheat for New York," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 828, Jan. 1946, H. H. Love and W. T. Craig.

"A Year to Remember," N. C. Agr. Ext. Serv., State College Sta., Raleigh, N. C., 1945.

"Record of a 50-year-old Apple Orchard," Agr. Exp. Sta., Wooster, Ohio, Bul. 661, April 1946, C. W. Ellenwood and T. E. Fowler.

"Dairy Farming Based on the Liberal Use of Meadow Crops," Agr. Exp. Sta., Wooster, Ohio, Bul. 662, Aug. 1946, M. A. Bachtell, C. J. Willard, W. Livezey, and C. F. Monroe.

"Your Lawn," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, No. 271, May 1946, C. J. Willard and Victor H. Ries.

"Trials of Sweet Corn Hybrids at Columbus, Ohio, 1945," Dept. of Agron., Agr. Exp. Sta., Wooster, Ohio, Agron. Mimeo. 100, March 1946, J. B. Park and P. P. Preston.

"Wide Row Planting of Small Grains to Establish Sweet Clover and Lespedeza," Agr. Exp. Sta., Stillwater, Okla., Bul. B-298, June 1946, Horace J. Harper.

"Chemical Defoliation of Cotton," Agr. Exp. Sta., Stillwater, Okla., Bul. B-302, Aug. 1946, H. E. Dunlavy, I. M. Parrott, M. Gober, and C. H. Brett.

"Cowpeas in Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Mimeo. Cir. M-160, May 1946, L. L. Ligon.

"Forage Production of Winter Small Grain Varieties and Annual Rye Grass and Effect of Clipping Upon Grain Yields," Agr. Exp. Sta., Stillwater, Okla., Mimeo. Cir. M-161, May 1946, Hi W. Staten and W. C. Elder.

"Ladino Clover, A Perennial Pasture and Hay Legume," Agr. Ext. Serv., Pa. State College, State College, Pa., Cir. 296, April 1946, J. B. R. Dickey.

"Fifty-eighth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College," Clemson, S. C., Feb. 1946.

"Tobacco Production," Clemson Agr. College, Clemson, S. C., Cir. 287, July 1946, H. A. McGee and J. M. Lewis.

"Alfalfa Production in South Carolina," Clemson Agr. College, Clemson, S. C., Cir. 290, July 1946, H. A. Woodle and W. H. Craven.

"Fifty-seventh Annual Report, 1944," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn.

"Oat Variety Studies in Tennessee," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. 199, April 1946, N. I. Hancock and O. H. Long.

"Growing Berries and Grapes," Agr. Ext. Serv., Univ. of Tenn., Knoxville, Tenn., Publ. 297, March 1946, W. C. Pelton.

"Report of Cotton Variety Test, 1945," Agr. Exp. Sta., Texas A & M, College Sta., Tex., P. R. 979, J. W. Collier.

"Grain Sorghum Yields," Substation No. 12, Texas A & M, Chillicothe, Tex., P. R. 990, March 6. 1946, J. R. Quinby.

"Barley Experiments," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1004, May 6, 1946, I. M. Atkins, and P. B. Dunkle.

"Oat Experiments," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1005, May 6, 1946, I. M. Atkins and P. B. Dunkle.

"Wheat Investigations," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1006, May 6, 1946, I. M. Atkins and P. B. Dunkle.

"Date Palm Culture in the Texas Winter Garden," Substation No. 19, Texas A & M, Winter Haven, Tex., P. R. 1007, May 8, 1946, E. Mortensen.

"Annual Soil Building Crops for the Blacklands of Northcentral Texas," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1009, May 10, 1946, P. B. Dunkle.

"Madrid Sweetclover," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1010, May 10, 1946, P. B. Dunkle.

"Cotton Variety Tests at Denton," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1011, May 10, 1946, P. B. Dunkle.

"Grasses for the Black and Clay Loam Lands of Northcentral Texas," Substation No. 6, Texas A & M, Denton, Tex., P. R. 1013, May 13, 1946, P. B. Dunkle.

"Gains of Heifers on Native and Improved Pastures in the Gulf Coast Prairie of Texas," Substation No. 3, Texas A & M, Angleton, Tex., P. R. 1018, June 24, 1946, W. F. Turner, N. F. Willey, and J. H. Jones.

"Alfalfa Production in Virginia," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Bul. 393, April 1946, T. B. Hutcheson, M. H. McVickar, and T. J. Smith.

"Mineral Constituents and Protein Content of Certain Grasses and Legumes Grown in Pure Stands on Three Soil Types," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., T. Bul. 102, Aug. 1946, N. O. Price, W. N. Linkous, and H. H. Hill.

"Pasture Guide Posts," Va. Polytechnic Inst., Blacksburg, Va., Cir. 375, Rev. July 1946.

"What's New in Farm Science," Pt. II of Annual Report, Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Bul. 469, May 1946.

"Bromegrass & Alfalfa for Hay, Pasture, or Silage," Agr. Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 344, May 1944 (Rev. Jan. 1946), H. L. Ahlgren and F. V. Burcalow.

"Tobacco Growing in Wisconsin," Agr. Ext. Serv., Univ. of Wis., Madison, Wis., Sten. Cir., Jan. 1946, James Johnson.

"Fifty-third Annual Report of University of Wyoming Agricultural Experiment Station, 1942-1943," Univ. of Wyo., Laramie, Wyo.

"Carrot Production in the West and Southwest," U.S.D.A., Washington, D. C., Cir. 750, July 1946, T. W. Whitaker, J. H. MacGillivray, J. T. Middleton, and W. H. Lange.

"The Cultivation of Hevea Rubber on Small Plantations," Bu. of Plant Ind., U.S.D.A., Washington, D. C., March 15, 1946, W. E. Klippert.

Economics

"Avacado Production Cost and Efficiency Analysis, Tenth Annual Summary with Ten Year Average, San Diego County," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., 1945.

"Irrigated Pasture Management Study, Imperial County," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., 1945.

"Adjustments in Farm Organization Needed to Conserve Soil Resources in South-Central Indiana," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Bul. 515, 1946, F. V. Smith.

"Efficiency Dairy Program," Agr. Ext. Dept., Purdue Univ., Lafayette, Ind., Leaf. 268, 1946.

"Working Capital Needed to Farm in Central Indiana," Agr. Ext. Dept., Purdue Univ., Lafayette, Ind., Leaf. 275, 1946.

"Marketing of Cottonseed in Louisiana," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 400, Jan. 1946, James F. Hudson.

"Changes in the Apple Industry in Maine," Agr. Exp. Sta., Univ. of Maine, Orono, Me., Bul. 440, Dec. 1945, C. H. Merchant.

"Postwar Purchase and Improvement Plans of Farmers," Agr. Exp. Sta., Univ. of Md., College Park, Md., Bul. A40, Sept. 1945, A. M. Ahalt, S. H. DeVault, and L. E. Flesch.

"Apple Quality and Its Effect on Price and Rate of Sale," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 826, May 1946, G. E. Blanch.

"Farm Management in Oneida County, 1942-1943," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 830, March 1946, L. C. Cunningham and S. W. Warren.

"Farm Real Estate Activity in Oklahoma, 1945," Agr. Exp. Sta., Okla. A & M, Still-

water, Okla., Bul. B-301, Sept. 1946, R. T. Klemme, L. A. Parcher, and E. C. Ford.

"An Appraisal of South Dakota Production Adjustments in Agriculture, 1946 and Post-War," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Agr. Econ. Pamp. 18, July 1945.

"Washington Farm Security Administration Borrowers Weigh the Future," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 472, Jan. 1946, P. H. Landis.

"Charting a Route for Agriculture in West Virginia," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Spec. Cir. 2, June 1946.

"Economic Aspects of Canning Peas in Wisconsin," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Res. Bul. 158, Sept. 1945, W. W. Wilcox and J. B. Bowditch.

Seven Fat Years Followed Lean

Experience in the United States has run just contrary to the Egyptian chronicle of the seven lean years following the seven fat years of the Pharaoh's dream which Joseph interpreted. Here the seven "fat" years of high production have followed instead of coming before the seven "lean" years preceding (1933-39). However, as a result of the change in demand—both national and world-wide—the farm situation in the "lean" years was characterized by a threatening and persistent "surplus" problem. In the "fat" years, the parade of record-breaking crops has not been able to match the war-created requirements, and "shortages" have accompanied bumper crops.

These contrasts appear in U. S. Department of Agriculture tabulations of crop production. By using the August Crop Report figures for the seventh fat year, and official estimates for previous years, simple addition shows a production of more than 21 billion bushels of corn for the seven years of 1940 to 1946. For the seven previous years the "lean" production was 15.4 billion bushels. For wheat, the figures show almost 7 billion bushels in the seven fat years and 4.8 billions in the lean period. For oats, the record stands at more than 9 billion bushels compared with 6.5 billion.

The record reveals that for these crops, production in two "fat" years has been nearly equal to three of the "lean" years. And the United States has experienced seven successive fat years of good crops! Crop experts agree that the weather is a principal item. They mention as other elements in the picture: hard work and planning by farmers, improved machinery, and better cultural practices that include such items as use of fertilizer, hybrid corn and improved varieties of other crops, and control of erosion. From the standpoint of human nutrition, substitution of machines for horses as farm power has released much acreage for food growing.

Mechanizing Peanuts

Peanut growers have opportunities to increase production efficiency through increased mechanization, Secretary Anderson suggested at the recent meeting of the National Peanut Council. He said: "A sheller has been perfected by our agricultural engineers which will shell as many peanuts in one hour as 300 men can shell in that time. Our engineers have also developed a tractor-

mounted, two-row harvester which digs, lifts, shakes, and windrows peanuts, all in a single operation. By hand methods it takes one man 32 hours to carry out these operations on an acre. The machine will harvest two acres an hour—the equivalent to a crew of 64 men. Peanut growers also have much to gain from greater use of cover crops, better crop rotations, and greater knowledge of plant-food requirements."

Soil Requirements for Red Clover

(*From page* 19)

was in the stems. When hay is harvested and field cured there is considerable likelihood that a portion of the leaves may remain on the land, but the stems are usually very thoroughly removed. This entails a relatively large removal of potassium from the land.

The data in table 3 indicate that there are approximately 41 pounds of potassium in a ton of red clover hay composed of the percentages of leaves, stems, and bloom given (table 3). None of the five samples included in this average came from potash-treated fields or plots, although two samples came from manured land. These 41 pounds of potassium are equal to about the amount in a 100-pound bag of 50% muriate of potash (41.5 lbs. K). For each ton of clover hay removed from the land there is approximately the equivalent of 100 pounds of muriate of potash in the hay. It is not unusual to remove three tons of clover hay from an acre in the first and second cuttings of red clover in a single season. This means that it would require about 300 pounds of muriate of potash per acre so that there would be no loss of potassium from the removal of this crop.

Most practical men in the Midwest and other sections of the country consider red clover as a soil improvement crop and have not yet been brought to realize that this crop may also rob the soil of some of its very important fertility elements.

Fertilizer Inequalities . . . Can They Be Corrected?

(*From page* 14)

differences are not large enough to be considered significant) yields were higher in the "Revised Treatment Section" than on the same plot still receiving the original fertilizer application. Generally speaking, the yields were considerably greater for all crops in the "Revised Treatment Section."

An application of 100 pounds K_2O per acre to the plot originally receiving 40-70-0 has resulted in the greatest increase in the yields of both corn and wheat. The use of this quantity of potash resulted in an increase of 24.0 bushels corn and 6.9 bushels wheat. This response to potash was the most noticeable of any single nutrient addition. However, the addition of potassium and phosphorus to the plot which had received only 40 pounds nitrogen yearly from 1914-42 gave still greater increases. When 70 pounds P_2O_5 and 100 pounds K_2O were added to this plot, yields increased as follows—corn

TABLE 2.—POPULATION COUNTS EXPRESSED AS PER CENT GRASS, CLOVER, AND WEEDS FOR THE ORIGINAL FERTILIZER TREATMENT SECTION, RESIDUAL SECTION, AND REVISED TREATMENT SECTION OF THE OLD ROTATION EXPERIMENT FOR 1946. FIRST YEAR HAY.

Original Treatment Section				Residual Section				Revised Treatment Section			
Fertilizer treatment acre basis	Clover	Grasses	Weeds	Fertilizer treatment	Clover	Grasses	Weeds	Fertilizer treatment acre basis	Clover	Grasses	Weeds
	Per cent	Per cent	Per cent		Per cent	Per cent	Per cent		Per cent	Per cent	Per cent
40–70–100	30	65	5	Plots received	30	69	1	0–36–18	30	68	2
0–70–0	60	38	2	original fertilizer	24	74	2	40–0–100	21	78	1
40–70–0	16	82	2	treatments from	20	78	2	0–0–100	43	56	1
0–70–100	43	56	1	1914–41 inc.	40	55	5	6–36–18	37	60	3
40–0–100	90	1	9	Since 1941 no ad-	78	4	18	0–70–0	80	16	4
40–0–0	2	38	60	ditional fertilizer	25	20	55	0–70–100	50	47	3
0–0–100	38	39	23	treatments have been made.	76	14	10	40–70–0	42	54	4

from 41.7 to 88.7 bushels; wheat from 5.8 to 12.8 bushels; first year hay from 1,941 to 3,599 pounds; and second year hay from 2,598 to 4,225 pounds.

The effect of the Revised Treatments on the change in plant population—grasses and legumes—has been most marked. Clover had just about disappeared on plots where the minerals had been depleted. It reappeared, however, after the limiting nutrients had been added. Stand counts made in the spring of 1946 are shown in table 2.

Valuable as have been the results of the original rotation fertility experiment at Blacksburg, as a basis for fertilizer recommendations, we are convinced that without the data on the residual and build-back phases herein reported, our job truly would be only one-half completed. In reporting the results of these studies for one full rotation, we do so knowing full well that the final story on fertilizer inequalities and the time required for their correction cannot be written until data from several rotations are available. However, the present rate of recovery of the Virginia rotation experiment under the revised treatment plan promises to add a new and interesting chapter to the final story of the true values of long-time fertility experiments.

Crop Requirements for Available Potash

(*From page* 24)

North Carolina gave points on the graph which formed two distinct groups, one for the soils of medium to high exchange capacity (above six milli-equivalents) and one for those of low capacity (below four milli-equivalents). The curve for the high capacity soils is fairly comparable to the one for corn in Figure 1 and its indicated potassium requirement for 90% yield of soybeans is about 155 lbs., whereas the indicated potassium requirement for 90% yield of soybeans on the soils of low capacity was only 50 lbs. Again, as in the case of Olson's data, the results suggest a higher availability of exchangeable potassium in soils of low exchange capacity.

Practical Application

Results from this and similar studies can be of great value in helping

farmers with their fertilizer problems. Many States now have soil-testing laboratories where farmers can send samples. Most of these laboratories include suggestions for crop fertilization when the results of the soil tests are sent to the farmers. Information on the fertilizer requirements of crops in any State, therefore, is invaluable to the man who must make suggestions for crop fertilization from the interpretation of soil-test results.

The graphs showing the yield responses of crops to potash in Tennessee are used as a guide in making suggestions for fertilization at the soil-testing laboratory in this State. For example, potash is normally included in the fertilizer recommendations for corn on those Tennessee soils testing below 150 lbs. of exchangeable potassium, whereas it is ordinarily included in the recommendations for Irish potatoes on Tennessee soils testing below 220 lbs. Similar data on the other fertilizer constituents are equally useful in the interpretation of soil analyses at the service laboratory.

Crop response to fertilization may, and often does, vary from State to State because of differences in soil or climatic conditions. On this account, studies of the response of crops to fertilization are being made in most States. As the results accumulate from these studies, farmers can expect more and more satisfactory answers when they ask "What kind of fertilizer shall I use—and how much?"

Summary

To correlate the levels of available soil potassium and crop response to potassium fertilization, field experiments were conducted with five crops in several sections of Tennessee over a period of four years. Potassium was used at two rates; nitrogen and phosphorus were applied uniformly to all plots, including the no-potassium check. All treatments were in triplicate. Soil samples for determination of available potassium were collected from all plot areas before fertilizer was applied.

Data for each crop were plotted on a graph, and smooth curves fitted to them. These curves indicate the following approximate levels of exchangeable

Fig. 5. Effect of potash on dark-fired tobacco. Left—no potash; right—150 lbs. of potash per acre. Dickson soil medium in exchangeable potassium (160 lbs. per acre).

Fig. 6. Cotton at the left received 75 lbs. of potash; that at the right only 25 lbs. of potash. Greendale soil very low in exchangeable potassium (100 lbs. per acre).

soil potassium above which potassium fertilization ceased to give significant increases in yield; corn 155 lbs. per acre; alfalfa, 160; cotton, 185; dark-fired tobacco, 190; Irish potatoes, 220. Data available from studies by several other investigators were graphed for comparison. The results are similar in those cases where soil and climatic conditions were comparable. The application of the results to fertilization practice are discussed.

References

Bray, R. H. *Soil-plant relations I. The quantitative relation of exchangeable potassium to crop yields and to crop response to potassium additions.* Soil Sci. 58: 305-324. 1944.

Hoover, C. Dale. *Residual effect of varying applications of potassium on the replaceable potassium in several Mississippi soils.* Soil Sci. Soc. Amer. Proc. 8: 144-149. 1943.

Nelson, W. L. and Colwell, W. E. *Fertilizing for better soy-beans in North Carolina.* Better Crops. 29(7): 22-26, 45-48. 1945.

Olson, L. C. *Laboratory data as an aid in interpreting the results of cotton and corn fertilizer experiments in Georgia.* Soil Sci. Soc. Amer. Proc. 6: 238-242. 1941.

Mechanical Production of Cotton in the Yazoo-Mississippi Delta

(*From page* 10)

Flaming usually is done when cultivation of middles for weed or grass control is necessary, but may be done when the soil is too wet to be cultivated. Cotton was cultivated 11 times and flamed 8 in 1945. Bringing the cotton to the size requisite for flaming, i.e., 3/16 inch diameter, at which time it will be 6 to 8 inches tall—provided it was thinned early—is the critical

period. If the tops of weeds or Johnson grass are above the flame zone, they eventually will have to be removed with the hoe. Crab, coco, and other grasses are susceptible to repeated flaming. Flaming is most successful if done when vegetation is dry and the sun is shining.

Flame cultivation is not a "cure-all" but rather an aid to mechanization. It has its limitations and requires planning for its use but will go far in reducing labor costs when intelligently used. More research under varied cultural conditions is necessary before both its limitations and potentialities are fully understood.

Results of Flaming

Those seeing flame cultivation for the first time are inclined to be disappointed. Flaming is a "flash" process in that the plants are exposed to the flame but momentarily. The young morning glory plant wilts immediately after exposure to the flame; in contrast, some plants do not show any change until 30 to 60 minutes have passed. The only change apparent in coco, or "nut" grass, is a darkening of color, and it may take two to three days for the ends of the blades to wither and die. This pest is, however, easily controlled with the flame. While short grass and small weeds are completely wiped out with one flaming, heavy grass requires three to four flamings for elimination. Best practice seems to be the complete cleaning of the drill before soil is thrown to the cotton, and it is doubtful that any "dirting" is necessary. Again it is emphasized that beds should be kept as flat as possible at all times. Clods thrown around the plant cause the flame to be deflected up into the plants, and leaves are scorched, which is to be avoided.

Flaming late in the season is very effective for vine control inasmuch as many seed germinate when early fall rains come. This is very necessary for mechanical picking, as vines interfere with the picking operation and also add trash and stain to the cotton.

Mechanical harvesting increases the amount of trash in the cotton. Defoliation with calcium cyanamid, if accomplished under proper conditions, helps in this respect. The need for more efficient cleaning, to be discussed by Mr. Gerdes in a companion paper, also the need for factual information concerning the effects of all phases of mechanization on fiber and spinning qualities led in 1944 to a series of studies cooperatively planned and executed by the various agencies at Stoneville. The investigations were as follows: (1) Cotton thinned mechanically, with weeds and grass controlled by the flame, was compared with cotton produced by regular plantation practice. Both drilled and cross-plowed cotton were used. Half of the area was defoliated with calcium cyanamid, while half was undefoliated. Further, half of each plot was picked by hand and half with the International cotton harvester, a machine having been purchased by the Delta Station for its experimental program; (2) the relation of variety, exposure, and time and method of picking to lint quality; (3) a comparison of several combinations of commercially available cleaning equipment used with five varieties of cotton grown commercially in the Delta. All samples were ginned at the U. S. Cotton Ginning Laboratory, and the seed and lint were tested in the Cotton Branch's fiber and seed laboratories. The field plots were adequately randomized, and where sampling allowed, the various data were analyzed by variance methods. Many samples were spun to obtain data on the spun yarns. These spinning tests were made in the Cotton Testing Laboratories at Clemson College and Texas A. & M. College; (4) a study of costs of mechanical picking, in cooperation with the owners of the 14 International cotton harvesters in use in the Delta.[3]

[3] See footnote 1.

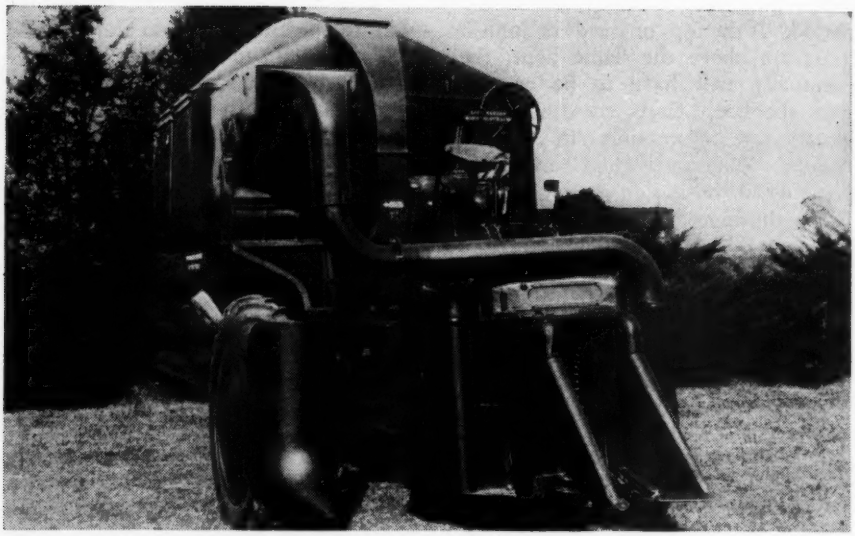


Fig. 7. International spindle-type cotton harvester.

The results of some of these studies are to be published in detail in "Mississippi Farm Research," official organ of the Mississippi stations, and only highlights of the mechanization work are given in this paper.

Mr. Gerdes will discuss the results of the tests involving exposure, methods of picking, et cetera; also the studies on cleaning five varieties of cotton picked mechanically. The results of the first test are given here. Provision was made for determining comparative effects on yield, classification, fiber and spinning quality of lint, and milling quality of the seed for drilled and checked plantings; hoeing and flame control of grass and weeds; defoliation with calcium cyanamid versus no defoliation; and picking by hand as compared with picking with the spindle-type picker. While yield was not affected materially by many factors, the increase due to cross-plowing was statistically significant. As has been pointed out, average yields of cross-plowed and drilled cotton grown on fertile soil producing approximately a bale per acre may be expected to be about the same. , The 1944 season was unusually dry. The cross-plowed cotton continued to grow and fruit, while the thicker planted, drilled cotton showed distinct effects of the drought. Cross-plowed cotton also produced a longer staple, stronger yarn of equal appearance, and higher grade seed of lower free fatty acid content than drilled cotton. Defoliation with calcium cyanamid improved the grade of the lint slightly and caused material reduction in picker and card waste. Defoliation also reduced the moisture content of seed cotton, seed, and lint, as well as the free fatty acid content of the seed.

Mechanical picking, as compared with hand picking, caused significant increases in moisture content of seed cotton, lint, and seed. This was undoubtedly due to the necessity of adding water to the spindles to obtain doffing of the cotton and to prevent accumulation of plant gums on the spindles. It increased foreign matter content of seed cotton, lint, and seed, with corresponding increases in picker and card waste. The yarn strength, however, was somewhat higher than for hand-picked cotton, and the appearance was equally as good.

The report has dealt entirely with

the use of the spindle-type picker (figure 7). This type is designed to pick cotton more than one time. This is important under Delta conditions if high spinning quality cotton is to be obtained, as it allows mechanical picking to be started practically as early as by hand. A stripper used commercially in the Plains section of Texas was tried at the Delta Station in 1944. It was necessary to wait, of course, until all of the cotton was open. Fall rains came before that time, and it was not until a freeze occurred that operation was possible. By that time considerable deterioration of the plants had taken place, and under these conditions the performance was not satisfactory. It might be of interest to know that it was tried later on an area of Macha cotton, a cotton developed in Texas for the Plains section, at another location in the Delta with somewhat better results. It would seem, however, that if the stripper principle is to be used under Delta conditions, one of different design and perhaps more gentle stripping action will have to be found. Several strippers of more or less promise are in various stages of development. If adequate machinery for cleaning cotton harvested by such means can be developed for the longer staple cottons, the stripper type machine may have a real part to play, especially when weather conditions are such as to cause rapid deterioration of fiber quality, with an urgent need to get the crop harvested.

Any machine or procedure that will enable cotton to be harvested early will materially increase the value of the crop. This must be kept in mind when the relative merits of hand picking are compared with machine picking, as machines eventually will be available while hand labor may not, with the result that the average value of the crop in terms of spinning value will be materially enhanced.

Three Thousand Miles to Market

(*From page* 26)

a potentially fine crop to near zero; a wind or hail at harvest will leave the grower with nothing but straw; and most important of all—the European vetch weevil has moved in. He leaves the grower only the worthless outside shells of the seeds. This year (1946) virtually all Oregon growers airplane-dusted their fields with DDT. Results are not perfect, but it is likely that hairy vetch is on its way back.

Next in importance in Oregon is Willamette vetch. It is a more winter-hardy strain of the old common or so-called spring vetch, not adapted to so wide a region in the South as hairy. It has of necessity been used in recent years because there was not enough of the preferred hairy vetch to go around. It has virtually replaced common vetch in Oregon because sometimes winter weather that removes the old type common will leave Willamette untouched.

Austrian peas have had acreage spurts and secessions up to 80,000 acres in Oregon at one time. The palouse country of Washington and Idaho heard of the peas, and as a result, production zoomed to 150,000,000 pounds with an annual use of not over half of that. In 1942 and '43 much of the crop was held over, the hold-over being in the hands of the Commodity Credit Corporation. Increased southern use, sales by CCC to Russia and other countries, and reduced acreages in the Pacific Northwest have combined to eliminate the carry-over, and the fall of '46 is showing a strong market.

Ryegrass is in a different category. It not only is used in the South, but nearly everywhere else. Many commercial lawn mixtures carry it, because it springs up fresh and green in a few days whereas the more permanent grasses grow very slowly. It not only is used as an erosion preventer, but as winter pasture and for hay. For these purposes it comes clear up to New York. Also many commercial pasture mixtures carry it because it makes a vigorous spring growth and provides feed while the slower starters are just getting up steam. Although the South is the largest user, every state in the union uses some, and the use is expanding tremendously.

Hungarian vetch, crimson clover, and purple vetch complete the list of Oregon-grown cover crops. All are grown on small acreages. The Hungarian variety has no particular advantage over Willamette except that it is almost aphid proof, will grow on wetter land, and sometimes it is cheaper. It usually yields less than Willamette on soils adapted to the latter, but often yields more on heavy clays or wet locations. Purple vetch is seldom used in the South. It lacks winter hardiness. California is the main user. Crimson clover is increasing in use, but it ripens too early in Oregon, often while spring rains are still frequent. The acreage of these three tends to remain low and constant.

Why Western Seed?

If the South sends six or eight million dollars diagonally across the country each year, why not grow the seed at home and save the money? Actually, that is happening to some extent. Arkansas is in the hairy vetch business to the extent of 14,000 acres this year. Oklahoma is producing 4 or 5 million pounds of ryegrass, and crimson clover production in the South is up to 15,000,000 pounds. But it is doubtful if the South will ever raise its entire needs unless new seeds come into the picture. So far, the more a state produces, the more people use it and the more they import. There are several reasons for importations: 1. The climate. Legumes dislike hot weather and the grower dislikes rain at harvest time. One reduces the crop, the other its quality. 2. Disease. Many root rots, mildews, and other fungi interfere very little with the legumes for cover crop purposes, but interfere drastically with seed production. Some follow the seed and interfere with a crop resulting from it. 3. Machinery and cleaning equipment. It costs at least $30 per acre in equipment to grow hairy vetch.

The South, however, is growing an increasing amount of a long list of competing legumes. These are summarized briefly:

1. Blue lupine. From 5,000,000 pounds in '43 the crop is up to 37,300,000 pounds in '46. Suitable only for the extreme South close to the gulf.

2. Caley peas (also called Singletary, a rough pea, and wild pea). More suitable for pasture and hay than for green manure.

3. Manganese bur clover. Very sensitive to lack of fertility. Used more for pasture.

4. Big flowered vetch. A wild vetch beginning to volunteer over parts of the South. Not very productive for cover crop purposes.

5. Bur clover. There are various forms. These are used now mostly in Mississippi where the state grew 2,000,000 pounds in 1945. However, the clovers planted 126,000 acres as compared to 700,000 acres of peas and vetches.

There are other local crops, Monantha vetch, Le Conte vetch, yellow trefoil, and a few others, all used only on small acreages.

The West is countering with a new legume of its own, Dixie Wonder, a strain of Austrian winter pea that can be planted in late fall and can still be turned under ahead of the regular crops. The biggest single headache with the legumes is that in many seasons they can't be turned down in time.

They are either plowed when there isn't much to turn down or else they are plowed so late that the following crop is injured. The Dixie Wonder threatens to overcome that.

All in all, it looks as though the cover crops are here to stay. They will shift in acreage from time to time and it is likely that new ones will appear, but it seems that the long haul from Oregon to the South will be with us for many years. With all of the huge developments, only a small portion of the soils that should have winter cover crops actually has them. At present they are seeded on less than 5% of the crop land in the South and the economy of the entire nation would be helped if that figure could be stepped up to 25% or more. So the use could be increased to at least five times the present amount if the proper seeds were available.

Using Potash in Soil Conservation

(*From page* 16)

equivalent, will double the tonnage of hay produced by an acre of lespedeza. Weighing the cost of this against the results, it is clearly *necessary* to apply potash to lespedeza. But do not make the mistake of applying it too late.

Potash has almost the same effect on other legumes and grasses. Dairymen insist that cows prefer to graze on pastures that have been limed and had phosphate and potash applied. They say that the increase is evident in the volume and richness of the milk produced, that the animals stay healthier, and that the cost of production is cut. Add to this the labor saved by letting the cows harvest the crop and spread the manure for you and you have a program that just cannot be overlooked.

Owing to supply and shipping problems you should accept delivery of muriate of potash whenever your dealer is able to supply you. Your needs

Ladino clover is an improved variety of white clover. Mecklenburg County farmers have experienced such yields as this when they applied a complete fertilizer strong in potash.

should be on hand as early as possible before you plan to apply it to the fields. This is true whether you plan to use the mixed phosphate and potash such as 0-10-10 or 0-12-12 fertilizers or whether you use muriate of potash. The demand is far in excess of the supply. Better get ready for fall seedings as soon as you can.

In a soil-building program lime, phosphate, and potash are essential to the success of the legume or other cover crop grown to turn as green manure. These minerals not only produce a more lush growth in the legume but they add the other necessary plant foods so necessary to a well-balanced soil. Many would be surprised to see how rapidly legumes can restore fertility and productivity to worn-out or eroded soils when the "Three Musketeers" of Lime, Phosphate, and Potash are added in proper amounts. These three plant foods are the "Pep-up Boys" for legumes and grasses.

Under the Government's Agricultural Conservation Program farmers in North Carolina may receive credit for the use of potash on the crops discussed in this article at a rate of three and one-half cents per pound of potash in the material used. This is equivalent to $1.75 per hundred pounds of 50% muriate of potash. This material is not being furnished by the Government under the purchase order plan because of short supplies. Farmers will report the use of this material when they report on their other soil-building practices at the end of the year.

Cluttered Calendars

(*From page* 5)

I try to revive some of that essence by sending the Wife a valentine—often easier to remember then than on the anniversaries of our wedding, which usually catch me cold and consign me to the doghouse. February 6 is labeled Social Hygiene Day, whereat my confusion is rampant, not knowing if it refers to living a cleaner life or bending my efforts to reform the customs and social negligence of my neighbors. Hence I drop it and spend my energy on Cherry Week and Sew and Save Week. The cherry harvesters and packers were cute enough to get dated up for the week which includes Washington's birthday, although he probably had less personal interest in cherries than he did in tobacco. As I finish up the last crumbs of my cherry pie on February 23, the calendar says it is time to ply the needle and push the bank account. My wife is able to observe her end of the sewing and saving deal much better than I am. I help her, however, by fetching more socks and torn shirts and pants to exert her thrift upon. There's nothing like family cooperation in all these eventful observances!

SAVE Your Vision Week hits me between the eyes March 3-9. The optometrists are pushing it. We used to call them eye-doctors and then buy our specs at the dime store. I believe the electric light arrangers are also allied in this drive—and my opinion is the motor clubs should be also. March 8 is fixed up as Farm Day, with no sponsor listed. Most city slickers will observe it by grim expressions about the high cost of living and the snap enjoyed by the hay shakers. One calm voice like mine raised in protest

is drowned out by the commies and the agitators. The green ribbons and snakes of Old Saint Pat soon give way to the fervid demonstrations of Hobby Week, beginning March 18. I boast few successful hobbies and can therefore partake in no local shows, except as an envious observer. Most hobbies spell too much hard work and concentration for me, but I do not object to a neighbor lad having one if he keeps his litter off my lawn. Lastly, March ends with Wildlife Week and Donut Week. I am a bit advanced in years and repleted to enjoy much of a fling during Wildlife Week, and I do not belong to the country club. My digestion on the fair circuit already has been injured beyond repair by sinkers and thick coffee, so dunking the grease balls is taboo.

QUICKLY passing over All Fools Day which applies to most of us, we find the April calendar heaped with variety. Army Day is on the 6th, time of delight for small boys watching parades and theme for rousing debates on "preparedness vs. imperialism." Between the 7th and 13th we face Want-ad Week, Be Kind to Animals Week, and Know Your Public Health Nurse Week. Not wishing to fritter my energies too widely, I choose the last-named suggestion, having a warm regard both for the profession and the sex. Honey for Breakfast Week follows from the 21st to 27th. I'll enjoy that one fully, if I can get the honey, but I maybe can't make it last for a whole week. Fisherman's Week handily comes as the honey disappears, but for one with drainage ditches the only waterways adjacent, this one must be observed by proxy. I glory in the final event of the April series, Noise Abatement Week, which puzzles me, however, because of the numerous airplanes and tom cats in my bailiwick; and likewise because my "noiseless" typewriter does not seem that way to neighbors after midnight. At least five Days and as many Weeks mark May's calendar. Hospital Day on the 12th brings to mind overcrowding of wards and pleas for more of the wartime zeal for volunteer bed-making, cleaning, and enema-giving by our women folks, while Maritime Day this year will find the ports open for business again—we hope. It seems queer why the eating-house props chose May 6-12, ending on Mother's Day, for their observance of Restaurant Week, because if there is anything with more contrast than the meals that Ma used to serve and the dishes thrown at you in the hasheries, I fail to find it. May 20-25 keeps us busy with Citizenship Week and Cotton Week. Sheets and diapers being so scarce, we suggest surprising the citizens this time with a comfortable stock of such native American goods as being the best way to celebrate it. Again my "aching back" interferes with proper attention to Tennis Week, starting May 25. Leaving that for you to handle, let's note the scheduled dates for Posture Week, from 6th to 11th, plugged by the Institute for Better Postures. If that were "Pastures" instead I could swing into it with bucolic enthusiasm. Let's change the "o" to an "a" and get the jump on them anyhow. As for the final event of the month, Memorial Day, my only gripe lies in the way so many observe it, since heroism and sacrifice for national service mean less to many folks than a fast car and faster company.

JUNE is an abused month indeed, for there occur but two Days and one Week in its 30-day period. Flag Day and Fathers' Day are all right, long may they wave but never waver, but Swim for Health Week still finds me snug in my bath tub. Strange that we have no Last Apple for Teacher Week, which should be referred at once to the commission merchants.

Amid the heat of July our publicity ardor diminished, apparently, for aside from the U. S. Birthday all we can

dig up to talk about is Farm Safety Week. As usual we try to crowd every warning and precept on accident-prevention with bulls and bees and tractors into seven days, and then urge speed and super-production per man regardless for all the rest of the crop season.

In similar manner, August is vacation time and nobody wants to spoil their fun with much ado about nothing, hence Aviation Day on the 19th is seemingly the only break in the routine —unless you want to celebrate Napoleon's natal day and mine on the 14th, or maybe combine those with V-J Day and quit work altogether.

Slowly getting up steam again, September deigns to include three noteworthy dates—Lessons in Truth Week, 9th to 15th, followed quickly by Felt Hat Day on the 15th and Constitution Day on the 17th. My old felt hat has weathered so many Septembers and other months that it can hardly get itself in real presentable trim for public observances; and likewise the constitution itself has withstood so many attacks and slanders and violations that one day more in the limelight won't disturb its serenity. I am not qualified by experience to dilate much about the aforesaid truthful week and so hasten to October—replete with special assignments.

IN this autumn tang interval we swim in celebrations, 13 in all. Newspaper Week begins Oct. 1, which means I must buy more Sunday comics and be more thorough in perusing the want ads and the editorials, and be more charitable toward the competing clamor of columnists. Knowing the bibulous nature of the profession, some smart guy trotted out Wine Week to run right afterwards. Business Women's Week and Fire Prevention Week bid for favor consecutively from the 6th to 13th. Between the 13th and 19th it's your duty to write to somebody, even the arrogant creditors, for that's dubbed Letter Writing Week, when ink bottles and stamp books must be well reinforced. If you think Honey Week confusing, give the dear lady the benefit of the doubt and you'll be safe, because honey in jars is mighty hard to get or pay for. The flow of weekly events ends with Apple Week and Better Hearing Week, both crowded into the last seven days. I must not overlook the Days either. On the 10th I hasten to get better acquainted with my stoical yellow laundryman, it being China Friendship Day, while Columbus Day and Navy Day spell duty as against the deviltry of Halloween.

NOVEMBER'S list is rather slim. Besides Thanksgiving and Armistice Day, the only things I can detect on the calendar are Author's Day on the 1st, Education Week, 10th to 16th, and Prosperity Week from the 25th to the end. My hunch is that if more authors were better educated our literature would improve. Now all that an author needs to get in good shape to be glad during Prosperity Week is a few smutty anecdotes and a good press agent. I also believe we could observe armistice memories much better if we muzzled a lot of loose-lipped warmongers on press and radio. If we could reform our authors and shut up our agitators, I could be thankful even if I had to eat sardines on the last Thursday of November.

Of course every day in December is "One-More-Shopping Day" and not much can logically interfere with the push toward Christmas. We do pause, however, for Pearl Harbor Day on the 7th, give a fleeting nod to Forefathers' Day on the 21st, and gaze in dubious dismay at what is left of our "rights" on Bill of Rights Day on the 15th. And so we have gone sketchily through the entire gamut of observances, with pardon asked if we have inadvertently omitted your favorite one.

I presume we would sorely miss the foam and tang of life were we to enact laws forbidding any further set-asides

on which to pay our devotions to something tangible or intangible. Nobody cares to become known as a blue-nose reformer, a nonconformist, and a belly-acher. You therefore have the privilege of being tolerant and indulgent, taking just what you want from the menu of festive occasions and tossing the rest to the dogs.

But on the other hand, American life is becoming very complex. As the variety and complexity increases, the rate of sickness from heart failure and fatigue and sloppy nerves goes up. Sometimes this makes us old-timers bred in the days of serenity and provincialism feel out of gear and rebellious.

Added to the routine of general public observances thus accounted for in everyday life, we who belong to certain lodges, unions, federations, and churches likewise owe allegiance to specific days and seasons, interlarded sometimes incongruously with the public pronouncements aforesaid. Endless committee meetings, society obligations, and kindred conclaves fritter away much of the so-called leisure time which they advance in argument for shorter hours of labor.

I AM not in favor of being a hermit or a recluse, because one will eventually spend a long time alone when life is over. However, it is self-evident that some reverie and soul-searching pauses often benefit all of us. Possibly a Retreat or Be Yourself Day, when one could shun the pressures and perplexities, the bitterness and inconsistencies and pettiness, would refresh and restore us for another long whirl with the world as it is.

I am a trifle "afeared" that unless we watch our steps with care, we too, like the w. k. calendar, will become cluttered with nonessentials and dated too far ahead with other people's problems to enjoy our families and do our home work.

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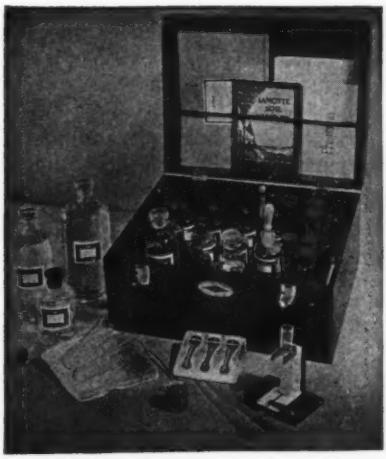

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ONE ON THE HOUSE

A group of men in a Western barroom were exchanging wild stories about their feats of courage and bravery. When the tall tales were almost at the breaking point, a quiet old Swede who had been silently drinking and listening, spoke up. "I myself, never do anything so very brave," he said. "But my brudder, he call Yesse Yames a big s.o.b."

The others were appalled. This was the wildest story yet. "What," they cried, "he called Jessie James a big s-o-b? Tell us about it."

"My brudder, he was drinking, and he get pretty drunk. Yessie Yames in same barroom. My brudder, he go over to Yessie Yames and say, 'Yessie Yames, you are one big s-o-b.'"

"What did Jessie James do?" demanded his listeners.

"He shoot my brudder!"

She: "My lawyer told me to say 'No' to everything."

He: "Do you mind if I hold your hand?"

She: "No."

He: "Do you mind if I put my arm around you?"

She: "N-n-no."

He: "We're going to have a lot of fun if you're on the level about this."

Many a man thinks he has an open mind when it is merely vacant.

Little Mike didn't like kindergarten and refused to go any more. His mother reasoned with him, scolded him, and insisted on his returning.

"Okay, Mom," he said. "If you want me to grow up to be a bead-stringer, I'll go."

A man rushed up to the new colored orderly at the hospital, excitedly asking: "Where is the maternity ward?" "Which one is yo' lookin' fo' boss," queried the new orderly, "de ladies, er de gentmun's?"

An old Dutch farmer, seeing an electric fan for the first time, exclaimed, "Py golly dot's a dam' lifely sqvirrel you got in dar, ain'd it?"

In the primary election the girl from the mountains asked for a ballot.

"What party do you affiliate with?"

"Do I have to answer that?"

"You do if you want a ballot."

"Then I don't want no ballot because the party I affiliates with ain't divorced yet."

She: "Men are contemptible creatures."

He: "Yeah, I know, thats why I run around with women."

Mrs. Smith: "My son's at medical school doing research on obstetrics."

Mrs. Jones: "Goodness, haven't they found a cure for that yet?"

Need for—

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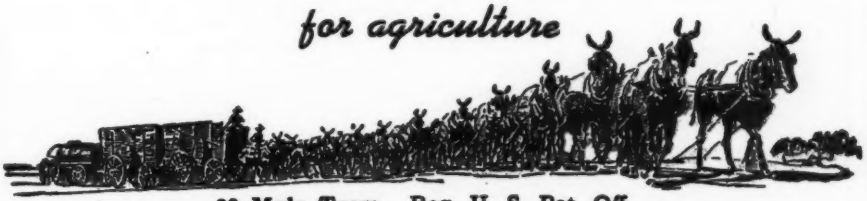

20 Mule Team. Reg. U. S. Pat. Off.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Better Corn (Midwest) and (Northeast)

Reprints

T-8 A Balanced Fertilizer for Bright Tobacco
N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
K-4-41 The Nutrition of Muck Crops
E-2-42 Fertilizing for More and Better Vegetables
H-12-42 Wartime Contribution of the American Potash Industry
H-2-43 Plant Food for Peach Profits
J-2-43 Maintaining Fertility When Growing Peanuts
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
FF-8-43 Potash for Citrus Crops in California
PP-12-43 Commercial Fertilizers for Livestock Farms
A-1-44 What's in That Fertilizer Bag?
H-2-44 Efficient Fertilizers for Potato Farms
X-6-44 Soil Management for Cannery Peas
AA-8-44 Florida Knows How to Fertilize Citrus
CC-8-44 Soil Fertility's Effect on Asparagus
QQ-12-44 Leaf Analysis—A Guide to Better Crops
C-1-45 Fertilizers for Cotton and Corn Following Lespedeza
C-2-45 Some Whys and Wherefores for Air-Conditioning Soils
K-2-45 Plow-Sole Fertilizing on the Average Farm
P-3-45 Balanced Fertility in the Orchard
R-3-45 Higher Corn Yields for North Carolina
W-4-45 Fertilizing Golf Greens
Y-5-45 How Long Do the Effects from Fertilizer Last?
Z-5-45 Alfalfa—the Aristocrat
DD-5-45 A Case of Combined Potassium and Boron Deficiencies in Grapes
EE-6-45 Balanced Sods in Orchards
FF-6-45 Orcharding from the Ground Up
GG-6-45 Know Your Soil
JJ-8-45 Plow-Under Practices
LL-8-45 Fertilizing for Better Soybeans in North Carolina
MM-8-45 Red Clover Suggests Shortage of Potash
NN-8-45 The Effect of Borax and Lime on Quality of Cauliflowers
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
PP-10-45 More Vegetables for Less Money
QQ-10-45 A Little Boron Boosts Sweet Potato Yields
SS-10-45 How to Start White Dutch Clover Pastures in Florida
VV-11-45 Borax on Crimson Clover in Tennessee
XX-11-45 Kudzu on Abandoned Land Needs Phosphate and Potash—Maybe Borax
YY-11-45 Potash—In War and Peace
ZZ-11-45 First Things First in Soil Fertility
BBB-12-45 Success with Blueberries
CCC-12-45 Poor Soils—Poor People
A1-46 Crop Production Horizons
B-1-46 Potash Increases Tomato Yield and Quality
D-1-46 A New Legume for the South—Wild Winter Pea
E-1-46 The Sources of Potash for Flue-cured Tobacco
H-2-46 Plow-sole Placed Plant Food for Better Crop Production
I-2-46 Boron Deficiency of Lettuce
J-2-46 Correcting Potash Deficiency in Growing Corn
L-3-46 Tomatoes Are a Field Crop in Western Ohio
M-3-46 Pasture Possibilities on Coastal Plain Hills
N-3-46 Sweet Potatoes Are Proving New Gold for the South
O-3-46 Fertilizer Placement for Corn in Kentucky
P-3-46 The Story of Potash
Q-4-46 Potash Treatment Makes Better Sweet Clover
R-4-46 Alfalfa in Mississippi Decreased as Soil Fertility Declined
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THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
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IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

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